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FORT UNION COAL REGION

SOUTHWEST GLENDIVE TRACT ANALYSIS

SITE SPECIFIC ANALYSIS

PRELIMINARY FACILITY EVALUATION REPORT

DAWSON COUNTY, MONTANA

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September 1981

Michael J. Penfold
State Director

PREFACE

This document contains a site-specific analysis and a preliminary facility evaluation report. The site-specific analysis discusses the consequences of leasing and mining a particular tract. The preliminary facility evaluation report discusses significant issues associated with an end use coal conversion facility.

There were 24 tracts identified through a screening process under the over-all direction of the Fort Union Region Coal Team. The team consists of federal, state, and local officials. The tracts are being evaluated for potential federal coal leasing for a coal lease sale scheduled for June 1983. The evaluation, called a site-specific analysis, has been completed for each of the 24 tracts.

Historically, development of a new coal mine in the Fort Union Coal Region has been associated with a coal conversion facility power plant in the vicinity of the mine. For this reason, the Regional Coal Team directed BLM to evaluate impacts of a typical facility near each potential mine. A preliminary facility evaluation report was prepared for each facility.

The Fort Union Regional Coal Team will begin ranking and grouping selected tracts into alternative leasing patterns for the 1983 lease sale using information from these individual reports. These groupings of tracts will form the basis for alternatives and a regional environmental impact statement to be developed during 1982. The analysis in this report represents an important step in a lengthy process which takes place prior to any final decision on federal coal leasing within the region.

Of the 24 tracts currently being evaluated, 16 would require the opening of new mines. One of the 16 would be specifically earmarked for small business. The remaining eight tracts constitute coal which would be needed to maintain production or prevent the by-pass of federal coal at an ongoing mining operation.

Approximately 1.6 billion tons of recoverable federal coal lie within the areas being evaluated. Final designation of some areas as unsuitable for mining under the 1977 Surface Mining Control and Reclamation Act will likely reduce the amount of federal coal actually available for leasing and development, and could remove several of the 24 tracts from further consideration. This information will not be available until early 1982.

A major purpose of the site-specific analysis and preliminary facility evaluation reports is to acquaint the public with key issues and consequences of leasing and development of federal coal reserves so that they may (1) offer comments to the Fort Union Regional Coal Team on what areas they consider most important to be evaluated and analyzed in the ranking of the tracts and in the Regional EIS and (2) offer specific advice on what decision alternatives the Coal Team should look at more closely.

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SITE SPECIFIC ANALYSIS

SITE
SPECIFIC
ANALYSIS

INTRODUCTION

The purpose of this action is to offer strippable federal coal reserves that can be further considered for coal leasing and development to help meet the energy needs of the Nation.

This site-specific environmental analysis has been prepared for the Southwest Glendive tract (see Map 1) in accordance with federal regulations (43 CFR 3420). It will be used by the Fort Union Regional Coal Team to further consider competitive leasing of federal coal within the tract for a June 30, 1983, coal lease sale schedule. If selected and leased, the Southwest Glendive tract will contribute 174.4 million tons of federal coal to the regional leasing target. Presently, a regional leasing target has not been established by the Secretary of the Interior. The preliminary regional leasing target will be established in August 1981 and finalized in October 1981.

BACKGROUND

In September of 1979, the Miles City District BLM Office completed the Redwater Management Framework Plan (MFP) for Dawson, McCone, Richland and Wibaux counties. The land use planning process included applying unsuitability criteria as much as possible, multiple-use conflict evaluation, and surface owner consultations. As a result of that work, areas were identified that could be further considered for coal development. The areas are available for consideration for new competitive leasing, leasing by exchanging and modifying existing leases (see Map 1).

Following land-use planning, the BLM requested expression of leasing interest which, along with other information, guided the USGS in delineating this tract. Results of that work are summarized in this profile.

Personnel from BLM's Miles City District inventoried the tract to determine the site specific resource values and then analyzed potential environmental effects of coal development on this individual tract. Among other items, the unsuitability criteria (43 CFR 3461) were reconsidered on this site-specific basis. Any new findings of unsuitability are reflected in this report.

To be further considered for new competitive leasing, the tract will be presented to the Regional Coal Team who ranks and selects tracts for a proposed lease sale schedule. The lease schedule and alternatives will be analyzed in a regional environmental impact statement (EIS). The EIS will analyze the site-specific and regional cumulative effects of coal leasing and development. Alternatives addressed in the EIS will include different combinations of tracts that meet a regional coal leasing target. The analysis of those groups of tracts could result in different impacts than the assessment made in this document for this specific tract. During the process the preliminary tract boundaries could be modified. Ultimately, the Secretary will select specific tracts for lease sale. If the tract is leased, the lessee will be required to submit a plan for mining and reclamation to the Secretary of the Interior, Office of Surface Mining (OSM) for review and approval within three years after leasing. Once a mining plan has been submitted, OSM will review the proposed developments of the mining plan. OSM will prepare a site-specific environmental assessment or EIS prior to approval of the mining plan.

Development of the tract is in accordance with the federal coal management program adopted by the Secretary of the Interior in June 1979. Basis of the program was, in part, the Final Environmental Statement for the Federal Coal Management Program. Implementation procedures are contained in Title 43 -Code of Federal Regulations - Part 3400 (43 CFR 3400). Authorizing actions are the Mineral Leasing Act of 1920, as amended; the Mineral Leasing Act for Acquired Lands of 1947, as amended; the Federal Land Policy and Management Act of 1976; the Surface Mining Control and Reclamation Act of 1977; the Multiple Mineral Development Act of 1954; the Department of Energy Organization Act of 1977; the National Environmental Policy Act of 1969: the Federal Coal Leasing Amendments Act of 1976; as amended; and federal regulations concerning federal coal leasing and development including 43 CFR 3400; 30 CFR 211; and 30 CFR 700-899.

TRACT DELINEATION REPORT SUMMARY

The Southwest Glendive tract is located in the Great Plains physiographic province and lies approximately ten miles southwest of Glendive in Dawson County, Montana. The tract contains one economical recoverable seam (the Pust bed) of lignite coal.

The seam ranges from 10 to 19 feet thick, with overburden reaching a maximum of about 150 feet. There are no known geological hazards to surface mining in the Southwest Glendive tract.

The generic mine plan calls for a surface mine using draglines, electric shovels, bottom-dump coal haulers, scrapers and other support equipment. A possible mining sequence for analysis purposes is shown on Map 2. The coal would thus be mined to a depth of 200 feet or until the limiting stripping ratio (20:1) has been reached. The plan indicates the most probable use of the coal would be an on-site liquefaction plant.

PRELIMINARY TRACTS

Redwater and Golden Valley

KRCRA Areas

1 Circle

2 Burns Creek-Thirteen Mile Creek

3 Southwest Glendive

4 Wibaux-Beach

Tract Delineation Areas

(1) Circle I

(2) Circle II

(3) Circle III

(4) Redwater I

(5) Redwater II

(6) Southwest Glendive

(7) Bloomfield

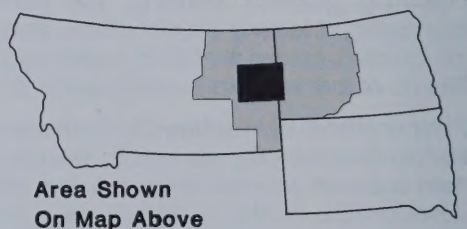
(8) Central Bloomfield

(9) Burns Creek

(10) North Wibaux-Beach

(11) South Wibaux-Beach

Total Ft. Union Coal Region

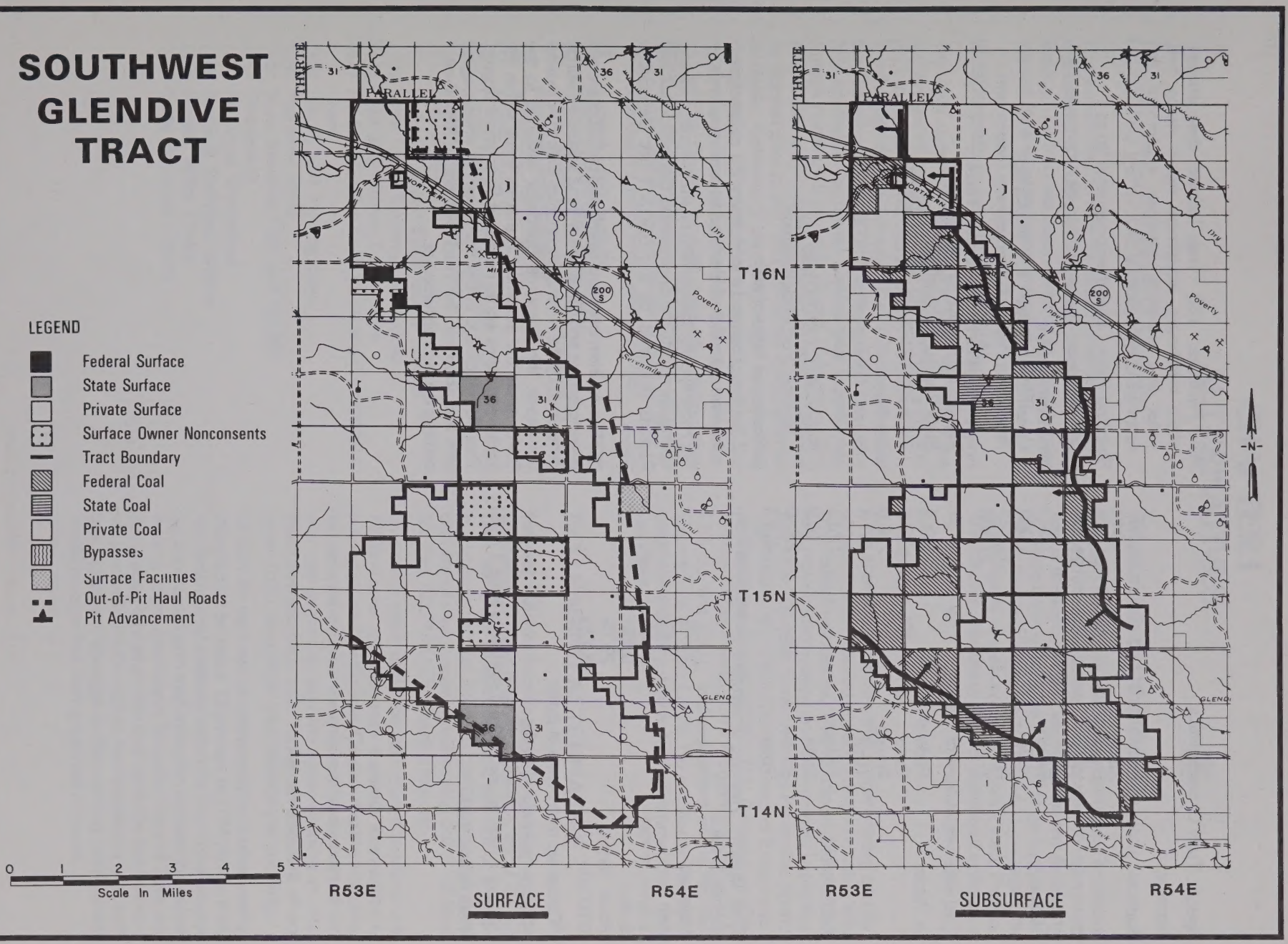


Area Shown On Map Above

★ Savage Mine

MAP 1

SOUTHWEST GLENDIVE TRACT



MAP 2

Specific Tract Characteristics:

Acreage:

Surface:	Federal	120
	State	1,040
	Private	20,148
	Total:	21,308
Coal:	Federal	7,543
	State	1,040
	Private	12,725
	Total	21,308

Coal Reserves/Millions of Tons:

In Place:	Federal	193.5
	State	11.3
	Private	256.6
	Total	461.4
Recoverable:	Federal	174.1
	State	10.2
	Private	231.0
	Total:	415.3

Coal Quality: Average of samples as received from vicinity of tract:

Moisture	35.7%
Ash	7.4%
Volatile matter	26.8%
Sulfur	0.3%*
Fixed carbon	29.7%
BTU's/lb	6,733

*Contained microveins of pyrite

Surface Disturbance/acres

Mining: Annual rate, 599.4; Total Life of Mine, 17,981

Haul Roads: 290

Mine Facilities: 160 - may include: changehouse, office warehouse, equipment repair shops, fuel, water and explosive storages, equipment and employee parking lots.

Stripping Ratio: Less than or equal to 20 to 1

Coal Thickness: Range 10 ft. to 19 ft.; average, 14.7

Mine Employment:
Construction Phase - 175 employees
Production Phase - 500 employees (maximum)

Annual Royalties and Severance Taxes:
Federal Royalty, $4.39 million
State Royalty, $0.26 million
State Severance Tax, $16.80 million.

Water Needs:
Human Consumption, 15,000 gal./day
Source: Well water

Nonpotable, 120,000 gal./day
Source: Fort Peck Reservoir

Relocation of Right-of-Way:
2.7 miles of railroad and Highway; 2.1 miles of pipeline and 4.4 miles of electrical transmission lines.

For more specific information on the proposed mining operation, refer to the Engineering, Geologic and Land Reports prepared by the USGS Tract Delineation Team.

NOTE: As the mine plans developed by USGS are of a generic nature and the actual mining sequence will be developed by the mining companies to fit their individual needs, the Resource Specialist assigned to the SSAs made the assumption that all lands within the tract boundaries would be disturbed to some degree. Therefore, acreage in the SSA may not always agree with that shown in the Tract Delineation Report concerning acreage disturbance.

CHAPTER I
ALTERNATIVES

LEASING AND DEVELOPMENT

This alternative is to offer for further consideration federal coal in the Southwest Glendive tract for competitive leasing. This tract has been identified as a logical mining unit for a 40-year surface mining operation.

Relationship to Land Use Planning

The tract does not include any lands for which the surface owner has filed a valid nonconsent to mining prior to March 1, 1981. Unsuitability criteria numbers 1, 2, 4 through 6, 8, 16 through 18 and 20, as defined in the federal regulations CFR Subpart 3461 has been fully applied to the private surface over federal coal. Criteria numbers 9 through 15 and 19 involving fish and wildlife are pending further study. This criteria will be applied prior to the Final EIS as the data becomes available. Criterion 3 involving buffer zones along rights-of-way and adjacent to dwellings must be resolved prior to mining. Criterion 7 on cultural resources will be cleared through mine plan submission, which will include mitigation or avoidance measures. Current unsuitability concerns are shown on Map 3. The following is a list of unsuitability criteria.

(1) Federal Land System
(2) Rights-of-Way and Easements
(3) Buffer Zones along R/W and Adjacent to Communities and Buildings
(4) Wilderness Study Areas
(5) Scenic Areas
(6) Lands Used for Scientific Studies
(7) Historic Lands and Sites
(8) Natural Areas
(9) Federally Listed Endangered Species
(10) State Listed Endangered Species
(11) Bald and Golden Eagle Nests
(12) Bald and Golden Eagle Roost and Concentration Areas
(13) Falcon Cliff Nesting Sites
(14) Migratory Birds
(15) State Resident Fish and Wildlife
(16) Floodplains
(17) Municipal Watersheds
(18) National Resource Waters
(19) Alluvial Valley Floors
(20) State Proposed Criteria

Relationship to Other Development

The tract contains one small inactive mine. The nearest active mine is the Savage mine located 40 miles northeast of the tract. The tract lies on the western flank of the Williston Basin oil and gas field. All of the federal lands within the tracts are subjected to oil and gas leases. No active leases or wells are located in the tract. Farming and ranching are the only other significant activities in or near the tract.

Mitigation Measures

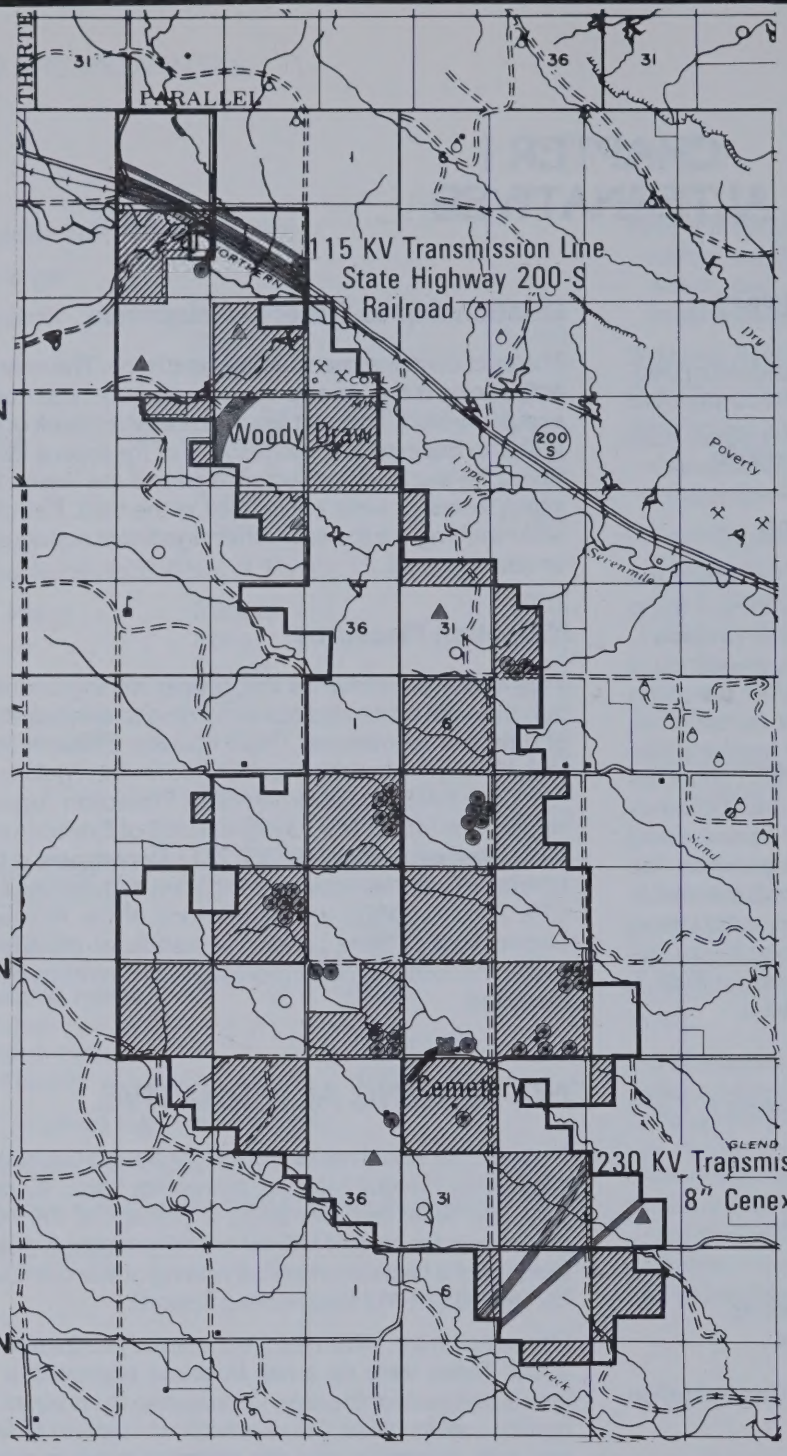
This alternative assumes that proper mining and reclamation will be carried out according to existing state and federal regulations. These include: Office of Surface Mining Reclamation and Enforcement regulations (30 CFR 700-899), Environmental Protection Agency regulations (40 CFR 0-1399), Council of Environmental Quality regulations (40 CFR 211), Department of the Interior's Coal Management Program regulations (43 CFR 23 and 3400), and regulations of the Montana Department of State Lands. No additional mitigation under the authority of the federal government has been identified.

NO LEASING ALTERNATIVE

Federal coal would not be offered for leasing under this alternative. Federal reserves represents about 42 percent and State reserves about 2 percent of the coal available in the tract. If federal coal is not leased, development of a large economical mining unit is not feasible (Ref. GS PLMU Engineering Report).

One small mine within the tract ceased production in 1968. There were no small business expressions of leasing interest for the area. Considering the amount of federal coal involved, the checkerboard pattern of federal coal ownership and the apparent trend in small mine development, near future development of any small coal mines in the tract boundary is not likely.

Should the tract not be considered for further leasing, there would be about 12 percent or (174 million tons) less federal coal available within the Fort Union Region for consideration in tract selection to meet the federal leasing target. Also about 10 million tons of State and 231 million tons of private coal would be lost for possible production in the region. As discussed in Chapter II, few significant changes to the existing environment would be expected during the next 30 years.



LEGEND

Areas that may be declared unsuitable for surface mining based on existing information.

- By BLM
- By Others
- Federal Coal
- Potential Dwelling
- Sharptail Grouse Dancing Grounds

0 1 2 3 4 5
Scale In Miles

-N-

SOUTHWEST GLENDIVE TRACT

MAP 3

CHAPTER II
AFFECTED ENVIRONMENT

This section is a description of the current environment with anticipated changes from ongoing trends. Within the Williston Basin there has been an increase in oil and gas exploration and this trend is expected to continue. The physical resources described in this section represent only existing conditions while the social and economic sections account for existing conditions and ongoing trends. It is recognized that the physical resource values may change due to future oil and gas exploration.

TOPOGRAPHY

Surface expression within the tract varies from relatively flat table land in the south to a more dissected rolling terrain in the north. Elevations in the area range from 2300 to 2800 feet. Drainage is primarily toward the east.

GEOLOGY

The area is underlain by sandstone, siltstones, and lignite belonging to the Tongue River Member of the Fort Union Formation (Paleocene). Thirty to fifty feet of Flaxville Gravel (Pliocene/Miocene) and Cartwright Gravel (Pleistocene) form the relatively flat terraces in the southern part of the area.

The Peuse bed is the only economical recoverable lignite seam in the tract. The seam varies from 10 to 19 feet in thickness. Overburden reaches a maximum thickness of about 150 feet. See figure 1.

Although no discoveries of other minerals have been made within the tract, the area is underlain by formations that are prospectively valuable for oil and gas. No other mineral values are known to occur within the tract.

SOILS AND RECLAMATION POTENTIAL

Soils within the tract are formed in weakly consolidated sandstone, alluvium and glacial till. The soils occur along steep, dissected sedimentary plains, and nearly level to rolling high terraces on uplands. Profile development and depths vary due to climate, parent material and geomorphic stability.

There are 34 soil series in the tract surveyed by the Soil Conservation Service at level two. Table 1 describes the erosion potential, reclamation potential, etc., of the soils found in the tract.

HYDROLOGY

Surface Water

The tract is drained by several small intermittent streams that flow southeast to the Yellowstone River. From north to south, the major drainages are Upper Sevenmile, Sand, Whoopup, and Clear Creeks (see Map 2).

The streams are all intermittent and flow mainly in response to summer thunderstorms and snowmelt in February through April. It is estimated that the streams have flow 30 days or less per year. The estimated annual yield from about 120 square miles drained by Upper Sevenmile Creek above its east intersection with the tract boundary is 2,240 acre-feet (AF) and the 10-year peak flow is 1,180 cubic feet per second (cfs). Sand Creek, draining about 35 square miles, has an estimated annual yield of 650 AF and an estimated 10-year peak flow of 670 cfs. A southern tributary to Sand Creek that drains about 15 square miles (notably secs. 7,8,17,18,20, and 21, T. 15 N., R. 54 E.) has an anticipated annual yield of 280 AF and an estimated 10-year peak flow of 450 cfs. Whoopup Creek drains about 13 square miles and has an estimated annual yield of 240 AF and an estimated 10-year peak flow of 430 cfs. Clear Creek drains about 140 square miles upstream of its easternmost junction with the tract and has an estimated annual yield of 2,610 AF and an estimated 10-year peak flow of 1,260 cfs.

The flow of these streams is used for stock and wildlife watering and contributes to the flow of the Yellowstone River. No samples of flow have been chemically analyzed but storm runoff would generally be a calcium bicarbonate type having a dissolved solids content ranging from about 200 to 800 milligrams per liter (mg/l). Low flows and base flow, including groundwater inflow, would range from about 800 to 3,000 mg/l in dissolved solids and probably would be a sodium sulfate type.

Groundwater

The principal aquifers in the tract are the near-surface alluvium, terrace gravel, Tongue River, and lower Fort Union. At greater depth is the Fox Hills-lower Hell Creek aquifer. The alluvium and terrace gravel aquifers contain groundwater under unconfined conditions (water table), the other near-surface aquifers contain water under semi-confined conditions, and groundwater in the deeper aquifers is confined (artesian). Groundwater flow in the near-surface aquifers is southeastward toward the Yellowstone River.

Only the alluvium, terrace gravel, and Tongue River aquifers have been developed in the unit. About 31

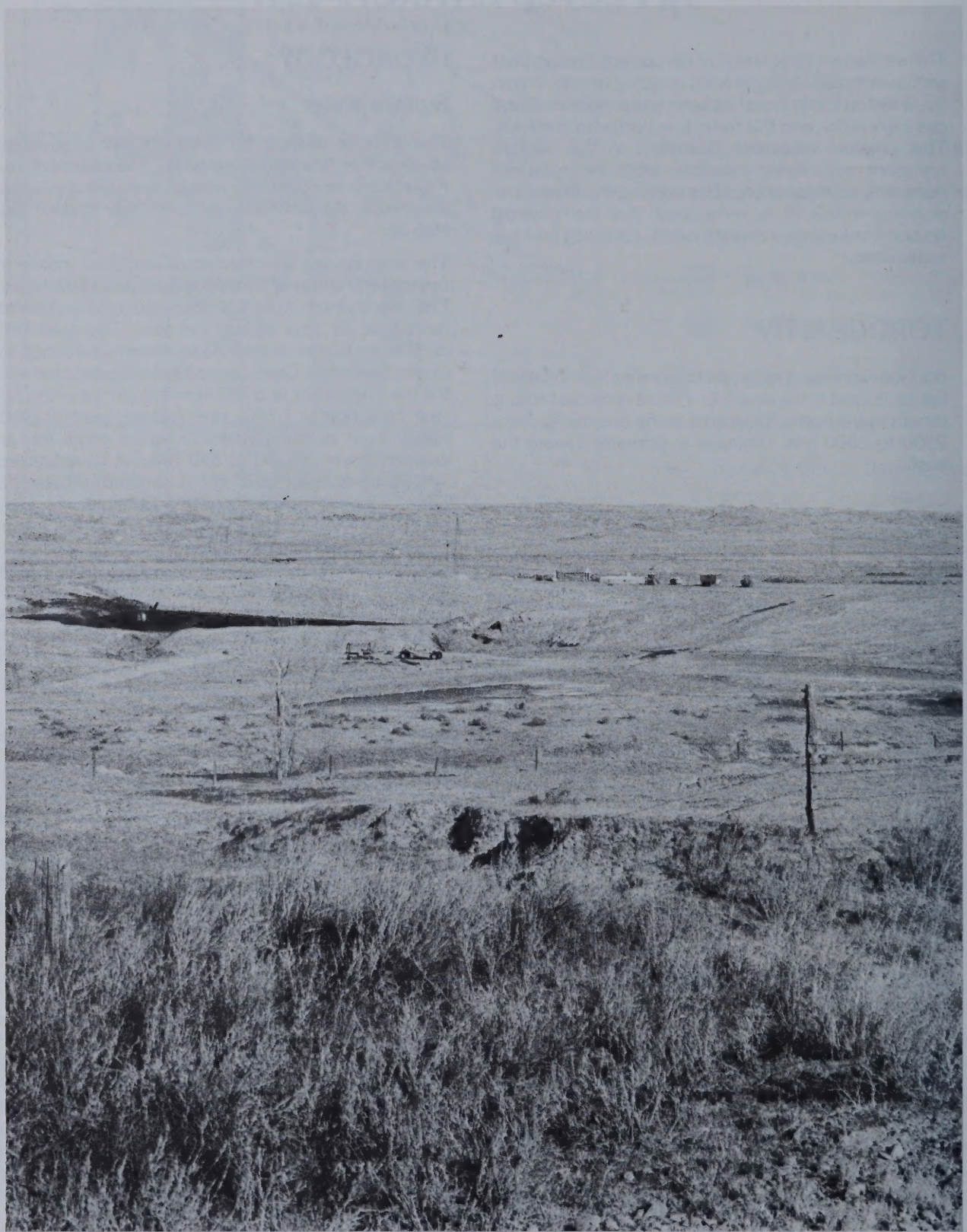


Figure 1. The Peuse surface mine provided the name for the major recoverable coal bed in the tract.

TABLE 1
SOUTHWEST GLENDIVE
SOIL EROSION

SOIL MAPPING UNIT NAME	DEPTH 1/ SHALLOW 0-20"	MODERATELY DEEP 20-36"	DEEP 36+"	PERCENT SLOPE	SOIL EROSION POTENTIAL 1/ WIND	WATER	SURFACE ACRES	PERCENT OF AREA	SOIL RECONSRT. POTENTIAL 2/	SOIL HAZARD CONDITIONS 2/	SUITABILITY OF SOIL MATERIAL FOR GROWTH (ACRE FEET) 3/ GOOD	FAIR	POOR
Beaverton complex:Turner-Beaverton Loams			X	4-15	Low	High	741	4	Poor	Too sandy, droughty	179	1332	2194
Cherry silty clayloam, Farnuf loam			X	0-4	Low	Low	1982	9	Fair	Excess lime, too clayey	789	9121	--
Cherry silty clayloam, Farnuf loam			X	2-8	Low	Mod.	701	3	Fair	Excess lime, too clayey	39	3466	--
Cherry-Lambert complex, Lambert gravelly loam			X	4-40	Low	High	307	2	Fair	Excess lime	--	1535	--
Cherry, Havrelon and Trembles Soils, occasionally flooded			X	--	Mod	High	908	4	Fair	Excess lime	--	4540	--
Dast-Blanchard complex		X(.60)	X(.40)	2-8	High	High	26	<1	Fair	Excess lime, too sandy	2	97	--
Dast-Blanchard complex		X(.60)	X(.40)	8-25	High	High	26	<1	Fair	Excess lime, too sandy	2	97	--
Farnuf-Shambo loams; Shambo loam; Havrelon silt loam			X	0-4	Low	Low	1216	6	Dawson County Soil Survey Report and SCS Soil Series Descriptions and Interpr Fair	Excess lime	841	5239	--
Farnuf-Shambo loams; Havrelon silt loam; Lambert silt loam Shambo loam; Shambo-Lambert Complex			X	2-8	Low	Mod.	3654	17	Fair	Excess lime	1818	16452	--
Lambert silt loam			X	8-15	Low	High	2231	11	Fair	Excess lime	--	11155	--
Lambert-Badland Complex	X(.40)		X(.60)	20-80+	Mod.	High	384	2	Poor	Excess lime, slope	--	1083	42
Lambert-Dimyaw			X	15-65	Low	High	2066	10	Poor	Excess lime, too clayey	--	5929	3946
Shambo-Lambert Complex			X	8-15	Low	High	266	1	Fair	Excess lime	197	1109	13
Tally fine sandy loam			X	0-4	High	Mod.	270	1	Fair	Droughty	675	675	---
Tally fine sandy loam			X	4-8	High	High	10	<1	Fair	Droughty	25	25	---
Tinsley-Lambert complex			X	15-65	High	Mod.	2523	12	Poor	Excess lime, droughty	25	5273	7317
Tinsley soils			X	15-65	High	Low	51	<1	Poor	Too sandy, droughty	--	17	238
Trembles fine sandy loam			X	0-4	High	Mod.	31	<1	Fair	Excess lime	--	155	--
Turner fine sandy loam			X	1-4	High	Mod.	72	<1	Poor	Excess lime, too sandy	29	138	192
Turner loam			X	0-2	Low	Low	1571	7	Poor	Excess lime, too sandy	644	3016	4195
Turner loam			X	0-4	Low	Mod.	992	5	Poor	Excess lime, too sandy	407	1905	2849
Turner-Beaverton loams			X	2-4	Low	Mod.	1280	6	Poor	Too sandy, droughty	410	2458	3533
TOTALS							21307	100			6082	74817	24519

Soil Depths
Shallow - 1%
Deep - 99%

Soil Erosion Potential

Wind	Water
Low - 81%	Low - 22%
Mod. - 6%	Mod. - 44%
High -13%	High - 34%

Soil Reconstruction Potential
Fair - 54%
Poor - 46%

Suitability of Soil Material for Plant Growth
Good - 6%
Fair - 70%
Poor - 23%
Unsuitable - 1%

1/ Soil Depth Classification and Soil Erosion Potential is derived from the Dawson County Soil Survey Report and SCS Soil Series Descriptions and Interpretations.

2/ Soil Reconstruction Potential is derived form the National Soils Handbook.

3/ Depth (in acrefeet) of available soil calculated from acres x acrefeet/acre = suitability of soil material for plant growth.

wells have been inventoried within the tract boundaries and 26 wells have been inventoried within one mile and downgradient of the tract boundary. The water is used for domestic and stock supplies. Depths to water in wells tapping the alluvium and terrace gravels range from 15 to 60 feet and the wells are as deep as 65 feet. Depths to water in wells tapping the Tongue River and lower Fort Union aquifers range from 30 to 70 feet and the wells are 60 to 165 feet in depth. Water from the alluvium and terrace gravel contains about 200 to 450 mg/l of dissolved solids, mainly calcium and bicarbonate, and lesser amounts of magnesium, sodium, and sulfate. Water from the Tongue River aquifer contains from 450 to about 2,000 mg/l of dissolved solids. The water is a sodium bicarbonate type containing substantial sulfate.

LAND USES

Vegetation and Agricultural Production

Agricultural operations in this area consist of: (1) livestock and (2) small grains and livestock (see Table 2). Most of the farming in this area is dryland with small areas being irrigated. A crop-fallow system is used in the dryland farmed area with mainly wheat or barley being grown. Small acreages are used for other small grains, forage crops, potatoes, flax or pasture.

There are currently 17 agricultural operators who have some or all of their operation within the tract. However, one agricultural operator has no cropland within the tract (see Table 3). Only 37.8 percent of the total cropland of these operators lies within the tract. This pattern varies greatly by operator. For example: the largest operator has 16,726 total acres (5,944 acres of cropland) with only 2,493 acres (972 acres of cropland) or 14.9 percent of the operation included in the tract while the smallest operator has 760 acres (389 acres of cropland) with 640 acres (270 acres of cropland) or 84.2 percent of the operation included in the tract.

Approximately 57 percent of the tract is rangeland, which indicates that livestock grazing currently is an important land use on the tract. Livestock also utilize cropland residues and farm products held back from the marketplace. Of the seventeen operations, only one is strictly a livestock-oriented operation.

Approximately 2,372 AUMs of native forage for livestock are produced annually on the tract. Assuming that the hay produced on the tract (see Table 2) was fed to livestock, an additional 4,420 AUMs would be available for wintering livestock. Winter grazing on the croplands varies tremendously, depending on the amount of moisture and the duration of cold weather. Under ideal conditions, at least 898 AUMs of fall-winter grazing would be available from the croplands. Normally only about 300 AUMs are available on the tract croplands, due to the difficulty in providing water for livestock during the winter months.

The vegetation is a mixture of grassland types. The main components are the Prairie County and Sandy Grassland types. The steeper upland areas are characteristic of the Badlands grassland type (Payne, 1973). The most prominent subtypes are sagebrush and steppe grassland. Badlands and riparian shrub areas are common on the tract. Small amounts of hardwood trees and juniper (shrub) are found on the tract.

About 36 percent of the tract is rolling hills or badlands. The gently sloping uplands and flats along drainages occupy the other 64 percent of the tract. Much of the gently sloping areas have been converted to croplands, especially in the central portion. Most of the sagebrush and shrubby areas are in the northern portion of the

TABLE 2[1]
Agricultural Land Use

Land Use	Tract Acres	Average Production Per Acre	Total Annual Production
Cropland	3,899	28.4 bushels	110,732 bushels
Hayland	1,105	1 ton	1,105 tons
Range	12,162	0.195 AUMs	2,372 AUMs
Other[2]	771	55 bushels	32,450 bushels
Fallow	3,370	0	0
Total	21,307		

[1]Data collected from Dawson County Agriculture Stabilization and Conservation Committee, Glendive, Montana, 1981.

[2]590 acres, oats; 181 acres, homesteads, roads, etc.

tract. There is also an existing surface coal mine in the north part of the tract that covers approximately 50 acres. The hardwood trees are found along Clear Creek. The junipers and riparian shrub are found in the Upper Sevenmile Creek drainage, and additional shrub areas are located in the Whoopup Creek Drainage.

About 42 percent of the tract is in poor to fair range condition, leaving 58 percent in good condition (Dawson County Conservation District, 1975). The available stockwater supplies are not spread evenly over the area, contributing to heavy grazing use in well-watered areas. Much of the tract has silty to gravelly soils, which have not produced very well under the recent drought conditions.

Agricultural Economics

This section will be forthcoming under separate cover.

Residential Homes

Approximately 12 residential homes and 34 outbuildings and a cemetery are located within the tract. The homes are served by existing underground telephone cables and overhead electrical transmission lines.

Transportation and Access

Good transportation access is available within and near the tract. State Highway 200-S passes through the northern tip of the unit and Interstate 94 is located two miles south. In addition, the Burlington Northern Railway passes through the northern tip of the tract. The North Pleasant View Road (county) passes near the tract from State Highway 200-S. Several seasonal roads and all-weather county and private roads traverse through the unit (see Map 3).

Existing Rights-of-Way (Corridors)

A 115 KV transmission line passes through three miles of the northern tip of the tract and also 4.5 miles in the south of the tract. An 8-inch refined oil product pipeline is located 3.2 miles southeast of the tract. A 10-inch high-pressure gas pipeline belonging to Montana-Dakota Utilities is located about 20 miles northeast of the plant site and the Northern Tier pipeline right-of-way is located approximately 55 miles to the north.

Recreation

The Bureau does not manage or operate any recreation facilities within this tract. Recreation preference has not been inventoried because surface ownership is exclusively private. Use of surface property necessitates prior landowner permission. This tract does have adequate road access. Seasonal hunting and rock hounding may occur within the tract. There are no wilderness values in the area.

WILDLIFE AND FISHERIES

A basic wildlife inventory encompassing this tract is in progress. Until this study is completed (field work, Oct. 81;, final report, Dec. 81), all the significant wildlife values of the tract cannot be assessed. To date, seven sharptailed grouse dancing grounds and one important hardwood draw have been identified (Map 3). More than half of the tract is native prairie which is essential for sharptails. The tract is part of big game hunting districts 731 and 732. Distribution information indicates good use by antelope in summer (Montana FW&P, 1977) but no appreciable winter deer concentrations on the tract (Montana FW&P, 1980).

There are no fish species of special concern (Elser, et al., 1980).

There are no public access fishing ponds managed by state or federal agencies on the tract. Although there is no substantial stream fishery within the tract, there is a northern pike population on the tract in Upper Sevenmile Creek (Morris, et al., 1981). This creek provides a limited sport fishery. For habitat class, Upper Sevenmile Creek is rated 3 (a Substantial Fishery Resource) on a scale of 1 to 5 (Morris, et al., 1981).

CULTURAL RESOURCES

The Southwest Glendive tract has not been systematically inventoried to date. Information from existing inventories (Davis, 1976; Greiser, 1980; BLM unpublished data) suggests that the predominant prehistoric sites should be lithic scatters of varying size, density and function (ca. 70-80%). Other expected prehistoric sites include stone circles (ca. 10%), ceramic-bearing sites, rock shelters and bison kills (ca. 10% combined). Expected historic resources include homestead and ranching remains (ca. 50%), historic grafitti and rock art (ca. 20%), freight roads, dugouts, stone cairns, trading posts, burials and battle sites (ca. 30% combined). Further information on cultural resource occurrence, distribution and significance cannot be quantified prior to inventory.

BLM-sponsored contract inventory in the Fort Union Coal region is scheduled for the summer of 1981 to generate information sufficient to identify and predict the nature, occurrence and significance of cultural resources in the tract in the regional EIS. Subsequent to inventory and prior to the regional EIS, BLM will apply unsuitability criterion 7 (43 CFR 3461.1 [g]) to all identified properties and will consult with the Montana State

TABLE 3

SOUTHWEST GLENDIVE

FARM/RANCH OPERATIONS 1/

OPERATOR	INSIDE COAL TRACT (acres)							OUTSIDE COAL TRACTS (ACRES)							
	SMALL GRAIN CROP	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	PERCENTAGE OF TOTAL ACRES LEASED	SMALL GRAIN	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	GRAND TOTAL	PERCENTAGE OF THE OPERATION WITHIN THE TRACT
1	137	11	1687	137	28	2,000	54.00	50	46	1,699	45	0	1,840	3,840	52.08
2	88	2	0	89	0	179	77.65	308	22	2,534	307	26	3,197	3,376	5.30
3	151	117	2265	133	189*	2,855	55.31	91	179	5,058	91	138	5,557	8,412	33.94
4	586	19	1376	520	19*	2,520	0	216	186	3,072	79	2	3,555	6,075	41.48
5	0	0	160	0	0	160	0	0	0	4,229	0	0	4,229	4,389	3.64
6	213	1	497	213	14*	938	0	0	0	1,079	0	0	1,079	2,017	46.50
7	395	75	205	389	16*	1,080	55.56	183	93	1,823	237	4	2,440	3,520	30.68
8	124	19	359	124	14*	640	0	68	51	1	0	0	120	760	84.21
9	497	182	568	497	256*	2,000	0	344	142	407	344	162	1,399	3,399	58.84
10	57	0	2	57	44*	160	0	157	200	1,338	157	72	1,924	2,084	7.68
11	294	126	728	253	41	1,442	80.44	760	209	1,603	612	99	3,283	4,725	30.52
12	180	262	101	125	12*	680	100	201	86	719	201	193	1,400	2,080	32.69
13	284	162	1042	271	41*	1,800	31.11	696	528	2,410	696	224	4,554	6,354	28.33
14	0	30	890	0	0	920	78.26	257	155	4,133	249	49	4,843	5,763	15.96
15	519	44	1500	386	44*	2,493	0	2292	641	9,261	1910	129	14,233	16,726	14.90
16	233	35	416	132	4*	920	0	150	44	409	80	0	683	1,603	57.39
17	141	20	266	44	49*	520	46.15	105	59	234	0	0	397	917	56.71
18															
19															
20															
21															
TOTAL	3,899	1,105	12,162	3,370	2/ 771	21,307		5,977	2,641	40,009	5,008	1,098	54,733	76,040	

1/ Data collected from Dawson County Agriculture Stabilization and Conservation Committee, Glendive, Montana, 1981

2/ 590 Acres, Oats; 181 Acres, Homesteads, Roads, etc.

* Homesteads, Roads, Reservoirs, Cemetary etc.

Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP) regarding the effect of coal leasing on National Register-eligible properties, in accordance with the ACHP Programmatic Memorandum of Agreement with BLM, OSM and USGS, Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended).

VISUAL RESOURCE MANAGEMENT

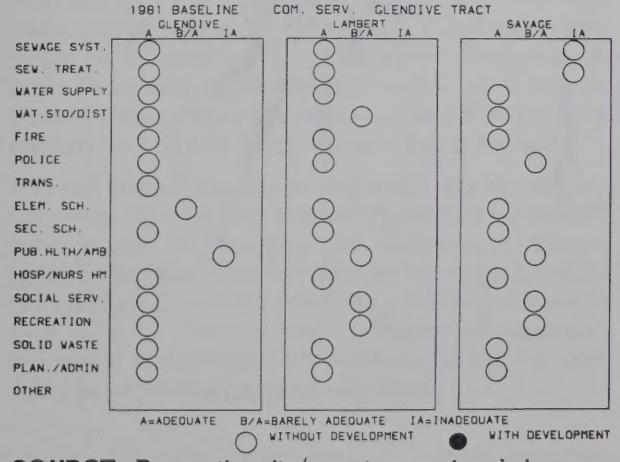
This mining tract lies in a scenery area rated "low". The rolling terrain is void of any significant or unique land features. Several creeks pass through the tract flowing to the Yellowstone River. Agricultural development is the predominant land use and adds seasonal variety (color) to the landscape. Numerous man made intrusions are within the tract (powerlines, homes, roads, reservoirs) but are not highly offensive in nature.

ECONOMICS AND SOCIAL CONDITIONS

Existing and forecasted population and employment levels for the communities of Glendive, Lambert, and Savage, Montana are shown in Figure 4 (in Chapter III). As this figure shows, future population levels in these communities without energy development (refer to dashed line) are expected to either decline somewhat or remain relatively stable from 1981 through 2000.

These communities are small agriculturally oriented towns which do not have the capability to accommodate any significant population growth without some strain on public services. As Figure 2 shows, all of the above communities are presently (1981) experiencing some problems in providing an adequate or barely adequate level of one or more types of public services. For example, Savage is currently experiencing an inadequate sewage treatment facility for its present population.

FIGURE 2



SOURCE: Respective city/county or regional planners.

Residents of Dawson County identified retail, medical care, recreation, and entertainment as the major service shortfalls of the area at this time. In Richland County, the condition of roads, medical care shortfalls, and the lack of retail and entertainment facilities were mentioned by residents as the most serious service problems in the area.

Roughly 80 percent of the thirty-six Dawson County residents interviewed were supportive of development, either with or without qualification. Those persons who qualified their support generally based it on the uncertainties of reclamation. The reasons for this high level of support in Dawson County were national energy needs, efficient use of the resource, and expectations regarding local job opportunities should development occur.

In Richland County (thirty-two interviews), roughly 3/4 of the respondents interviewed supported development; with reclamation being the major concern. Air quality, taxes, and relationships between landowners and coal companies were also concerns in Richland County. The major reasons given for support of development were national need and local economic growth.

While these levels of support appear to be quite high, this does not necessarily mean that residents are willing to unconditionally accept expanded mining in the area. Much of this support is qualified by the potential scale and location of development.

Community leaders in both Dawson and Richland counties generally supported development. Of the twelve leaders interviewed in the two-county area, ten either expressed outright support or qualified support for local mining. The reasons provided were very similar to those given by the general population including national energy need and local economic growth. Reclamation, distribution of taxes and revenues, housing, and adequate lead time for planning were concerns voiced by community representatives in Dawson and Richland counties.

Residents in Dawson and Richland counties indicated that the best thing about living in their communities is the small town atmosphere, including friendliness, cleanliness, and patterns of trust between people. On the negative side, the major complaints centered on the lack of retail and entertainment opportunities, the climate, and, in Sidney, the presence of large numbers of newcomers.

CLIMATE AND AIR QUALITY

The semiarid climate of east central Montana, which is typical of the Northern Great Plains, results from the area's extreme inland location. Rapidly changing meteorological conditions are common because of the movement of Pacific and Arctic pressure systems through the region.

The climate station utilized for meteorological data for the proposed lease tract is at Miles City (Table 4).

The annual mean temperature in the area is 46°F. The highest monthly mean temperature is 75°F (in July), and the lowest monthly mean temperature is 15°F (in January). The growing season averages 158 days at Miles City.

Precipitation in the area is quite light. Most of it is in the form of rain in late spring and early summer. Annual rainfall totals about 14.2 inches, and snowfall about 32 inches.

TABLE 4
Meteorological Data for Selected Sites*

	Miles City
Temperature, °F	
Mean Annual	46
Mean Monthly Minimum (Jan.)	15
Mean Monthly Maximum (July)	75
Growing season for Grass (temperature 32°F), days	158
Precipitation, in.	
Annual Average Rainfall	14.2
Monthly Range Rainfall	0.5-3.1
Annual Snowfall	32.2
Average No. of mo/yr with Snowfall	10
Annual Stability (by class), % occurrence	
Class A, B, C	15.8
Class D	54.3
Class E, F, G	29.9
Wind Direction	SE-S, 27% W-NNW, 35%
Windspeed, mph (% of time)	0-3.5 (8.4) 3.6-6.9 (23.3) 7.0-11.5 (39.6) 11.6-18.4 (21.3) 18.5-24.2 (5.5) >24.3 (1.8)
Average Windspeed, mph	10.6

*Sources: National Oceanic and Atmospheric Administration, 1980
Powder River Site Specific Analysis, 1981

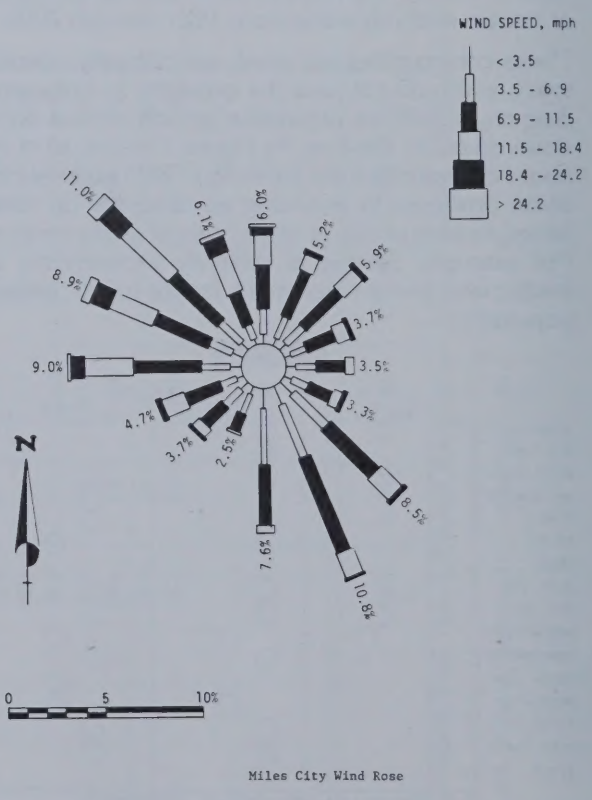
Wind data used in this analysis were obtained at Miles City, the only station in the area that had data suitable for input into the dispersion model used. The wind rose in Figure 3 represents a summary of these data. Winds are predominantly from the W to NNW 35 percent of the time and from the SE to S, 27 percent. Windspeed averages 10.6 mph annually and exceeds 11.5 mph 28.6 percent of the time.

Although the terrain offers little obstruction to the dispersion of pollutants, the area experiences prolonged periods of depressed mixing heights and low windspeeds, which tend to concentrate pollutants.

According to total suspended particulates (TSP) monitoring data, annual geometric means in this area is 25.9 ug/m^3 and the arithmetic mean is 42.5 ug/m^3. The sparse population in the area precludes consideration of the sampler as an urban impacted site. The background level for this analysis was determined to be 42.5 ug/m^3.

No Class I area falls within the impact range of the proposed tract. Visibility in the area ranges from 45 to 70 miles.

FIGURE 3



Miles City Wind Rose

CHAPTER III
ENVIRONMENTAL CONSEQUENCES

TOPOGRAPHY

Evidence of mining and reclamation would remain in the form of less contrasting topography in the northern part of the tract.

GEOLOGY

Production through the life of mine is estimated at 415.4 million tons of lignite. During this time, the tract would be temporarily committed to a single use that would in turn impact other uses.

The lignite removed by mining and that portion left by current recoverable techniques, about 46.1 million tons, would be lost from future use.

SOILS AND RECLAMATION POTENTIAL

The proposed action would have a significant impact on the soil in the tract (see Table 1). By the end of mine life, 21,307 acres would be disturbed.

Soil impacts include: displacement of soil from wind and water erosion, change in soil structure and natural fertility, soil compaction from haul roads.

In the tract 81 percent of the soil has a low potential displacement of soil by wind erosion and 44 percent of the soil has a moderate potential for water erosion (see Table 1). Proper seeding of the stockpiles would reduce this erosion potential.

Disturbances of the soil would result in alterations of soil structure and porosity. This alteration would affect permeability, infiltration rates, soil-air and soil-water relationships and bulk density. The natural fertility would be affected by disruption of the nutrient cycle and a decrease in organic matter content within the soil. Salinity content would increase as a result of the lower calcareous horizons being brought to the surface.

The soil hazard conditions determine the reconstruction potential. The tract is rated 54 percent fair and 46 percent poor for reconstruction. Suitability of the soil material for plant growth is rated as 6 percent good, 70 percent fair, 23 percent poor and 1 percent unsuitable (see Table 1). The soils rated poor can be reclaimed, but would require more intensive and costly management to be revegetated and stabilized.

HYDROLOGY

The operation of a mine including development of an industrial water supply would cause the destruction of as many as 31 known wells located within the tract. The 26 known wells near the boundaries and to the southeast of the tract could suffer lowered water levels during mining and possibly a degraded water supply following mining and reclamation. The degradation would be owing to additional solution of dissolved ions by groundwater passing through the returned spoils in the reclaimed mine workings.

No significant impact is anticipated from potential alteration of surface flow or from development of additional public water supplies.

LAND USES

Vegetation and Agricultural Production

The leasing and development alternative would have a significant short-term impact on individual agricultural operations in the tract. By the end of the mine life, 21,308 acres of the tract would be disturbed, in addition to 160 surface acres used for mine facilities.

An average of 149 acres of cropland, excluding summer fallow, would be removed from production each year. This would be an average annual loss of 4,232 bushels of wheat. This 149 acres of cropland would be out of production ten to fifteen years with a maximum of 1,481 to 2,245 acres out of production in any one peak mining year, resulting in a maximum loss of 42,060 to 63,758 bushels of wheat annually.

Peak mining year disturbance of 1,105 acres of hayland would result in an annual loss of 1,105 tons of hay production.

An average of 405 acres of rangeland would also be removed from production each year, resulting in an average loss of 79 AUMs. This 405 acres of rangeland would be out of production ten to fifteen years with a maximum of 4,013 to 6,081 acres out of production in any one peak mining year, resulting in a maximum annual loss of 783 to 1,186 AUMs.

Regionally, these losses would not pose significant reductions in area agricultural production. Analysis of economic impacts, both to individual operations and regionally will be forthcoming under separate cover.

Further analysis of Table 3 reveals that the agricultural production of the tract averages from 23 to 40 percent of the combined total production of all 17 livestock and grain operations. The low average is for summer range and pasture, while the high average is for the small grain cropland.

Most of the operators raise hay, both on and off the tract. Only two operators raise most of their hay inside the tract, while four operators raise little or no hay on the tract itself. As a group, the operators produce 30 percent of their hay supplies on the tract.

Just over half of the operators lease cropland or rangeland inside the tract. One operation is entirely on leased lands, but the eight other operators lease from one-third to four-fifths of their land inside the tract.

In addition to the loss of cropland and livestock forage to surface mining, some species may never adapt to the changed environment. Management of plant species that survive the mining operation would require knowledge and application of ecological principles (Oosting, 1956).

Chief items of concern on the tract are the juniper, hardwood, and riparian shrub subtypes. These areas are vital to many wildlife species.

The Montana Department of State Lands will set the standards for establishing a diverse and effective permanent vegetation cover on all rangeland areas, with coordination and cooperation from the Office of Surface Mining and the Bureau of Land Management.

Agricultural Economics

This section will be forthcoming under separate cover.

Residential Homes

Approximately nine residential homes and 20 outbuildings would have to be relocated or a 300-foot buffer zone maintained, which may be waived by agreement of owners of the occupied buildings. Relocation could be done on reclaimed land in the tract as mining progressed. A 100-foot buffer zone must be maintained around the Pleasant View Cemetery.

Transportation and Access

Access is available to the tract on an existing county (North Pleasant View) road. This road may have to be upgraded to accommodate heavy traffic. Approximately 2-1/2 miles of State Highway 200-S and Burlington Northern Railroad would have to be relocated or a 100-foot buffer zone maintained. Approximately 30 miles of private and county road would have to be relocated or a 100-foot buffer zone maintained. In addition, about 21 miles of out-of-pit haul road would be required, most of which is outside the tract boundary.

Existing Rights-of-Way and Needs

Approximately two miles of 230 KV transmission line and 2 miles of 8-inch pipeline may have to be relocated. Approximately two miles of right-of-way for a transmission line to the site would be needed. Approximately 2-1/2 miles of railroad spur may be needed, or a pipeline right-of-way to the Cenex pipeline right-of-way 3.2 miles southeast may be feasible for an additional pipeline. Approximately 160 acres outside the tract would be required for the mine and related facilities.

Recreation

A decision to lease would displace seasonal sportsmen who may hunt in the area. But after the mining phase (30 yrs) this activity would undoubtedly resume. Rockhounds (after Montana moss agate) would appreciate the proposed surface disturbance since it could uncover hidden agates. There is question whether these recreationists would be allowed to collect agates during the mining phase.

No other site-specific recreation impacts (or conflicts) are anticipated. The addition of mine employees into the region will certainly create new recreation pressures for public agencies. This activity will be directed at existing facilities throughout the area, e.g., intake, fishing access on the Yellowstone River, Makoshika State Park, etc.

WILDLIFE AND FISHERIES

If the known sharptail grouse dancing grounds and one important woody draw are declared unsuitable for surface mining, impacts to wildlife would be reduced. If not, the destruction of seven dancing grounds would be a significant impact. This would reduce the population in the entire area surrounding the tract which would reduce wildlife-oriented recreation. Destruction of the woody draw would be a long-term irreversible impact as reclamation of these areas has not yet been proven.

The northern pike population in Upper Sevenmile Creek would be destroyed. These fish escape from ponds above them and this would be a short-term impact if the drainage is adequately recreated. In any case the impact would only be moderately significant. Creation of fishing ponds after mining could increase fishing and other recreation opportunities.

Poaching and road kills have increased dramatically in areas of Montana, Wyoming and Colorado where energy development has occurred. The problem is compounded in areas where shift changes coincide with feeding periods, especially big game (Streeter, et al., 1979). The same would probably occur in this area. Actions to mitigate these impacts available to entities other than BLM would be to provide mass transportation of workers and adjusting the times of shift changes

which would greatly reduce poaching. This has been used successfully in other mining areas (Streeter, et al., 1979). Providing funds for the Montana Department of Fish Wildlife and Parks for increased law enforcement or adoption of a poaching clause in union contracts would also help.

Proposed road locations would result in road kills of wildlife as well as further destruction of habitat. As a result of disturbance, the reductions in wildlife numbers through direct mortality and habitat destruction, recreational opportunities such as wildlife viewing and hunting would be reduced in the area around the mine.

CULTURAL RESOURCES

Until a systematic inventory of cultural resources in the tract is completed, no definitive assessment of impacts can be made. All cultural resources within the tract would be subject to direct impact from construction of mine facilities, haul roads, water development, powerline and mining activity. Cultural resources not immediately impacted by the above activities are subject to impacts from increased erosion, access and vandalism. Direct impact would result in damage and destruction to cultural resources, artifacts, their immediate environmental context and the information these contain. Subsurface cultural resources not previously located by surface inventory would also be destroyed.

Development of alternatives for avoidance and preservation of identified properties is preferred, as these would minimize impacts to cultural resources. Should the tract be leased and these alternatives not be feasible, a scientific program of data recovery will be developed and implemented for all National Register properties or eligible properties within the tract.

VISUAL RESOURCE MANAGEMENT

The surface disturbance of 21,307 acres for mining and 450 acres for out-of-pit facilities would constitute the major visual impact. The associated equipment (dragline, bulldozers, coal shovels, etc.) and facilities (warehouses, office, shops, storage tanks and parking lots) would be additional visual intrusions. New utility corridors would be necessary for power and water. All the above would be visible to the casual observer and constitute a disruption of the existing landscape. The additional traffic load on the road systems and dust pollution would both be visible evidence of development. In short, the scenic quality of this tract would be reduced.

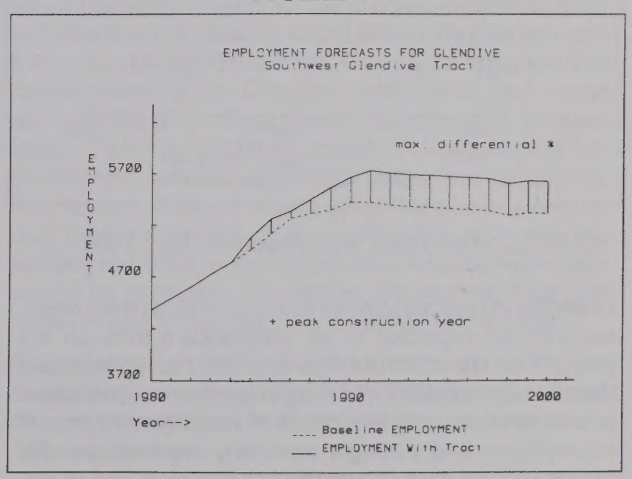
NET ENERGY ANALYSIS

A net energy analysis was calculated using the guidance contained in BLM Washington Office Information Memo 80-640, July 17, 1980. Approximately 37.7 British thermal units (Btus) would be expended to produce a pound of coal. That pound of coal would, in turn, produce about 6,733 Btus. The ratio of energy expended to that energy produced is 1 Btu/179 Btus.

ECONOMICS AND SOCIAL CONDITIONS

Construction and operation of the Glendive mine would result in minor impacts upon services in some communities within the areas as a result of population growth associated with employment opportunities. Figure 4 shows forecasted community employment and population levels through 2000 both with and without development of the tract. As this figure shows, Glendive, Lambert, and Savage, Montana, would experience increases in both population and employment as the result of the development of the tract.

FIGURE 4



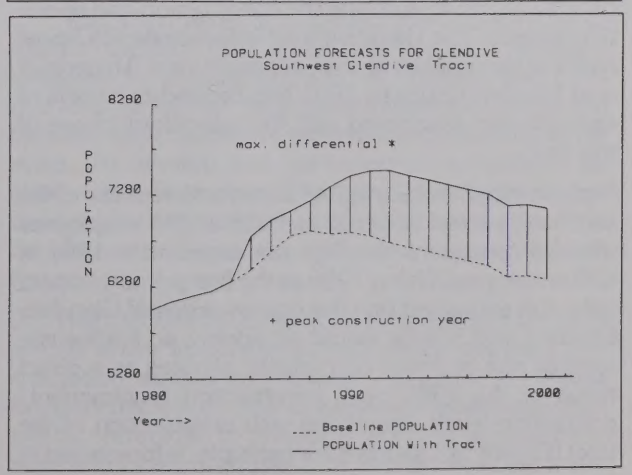
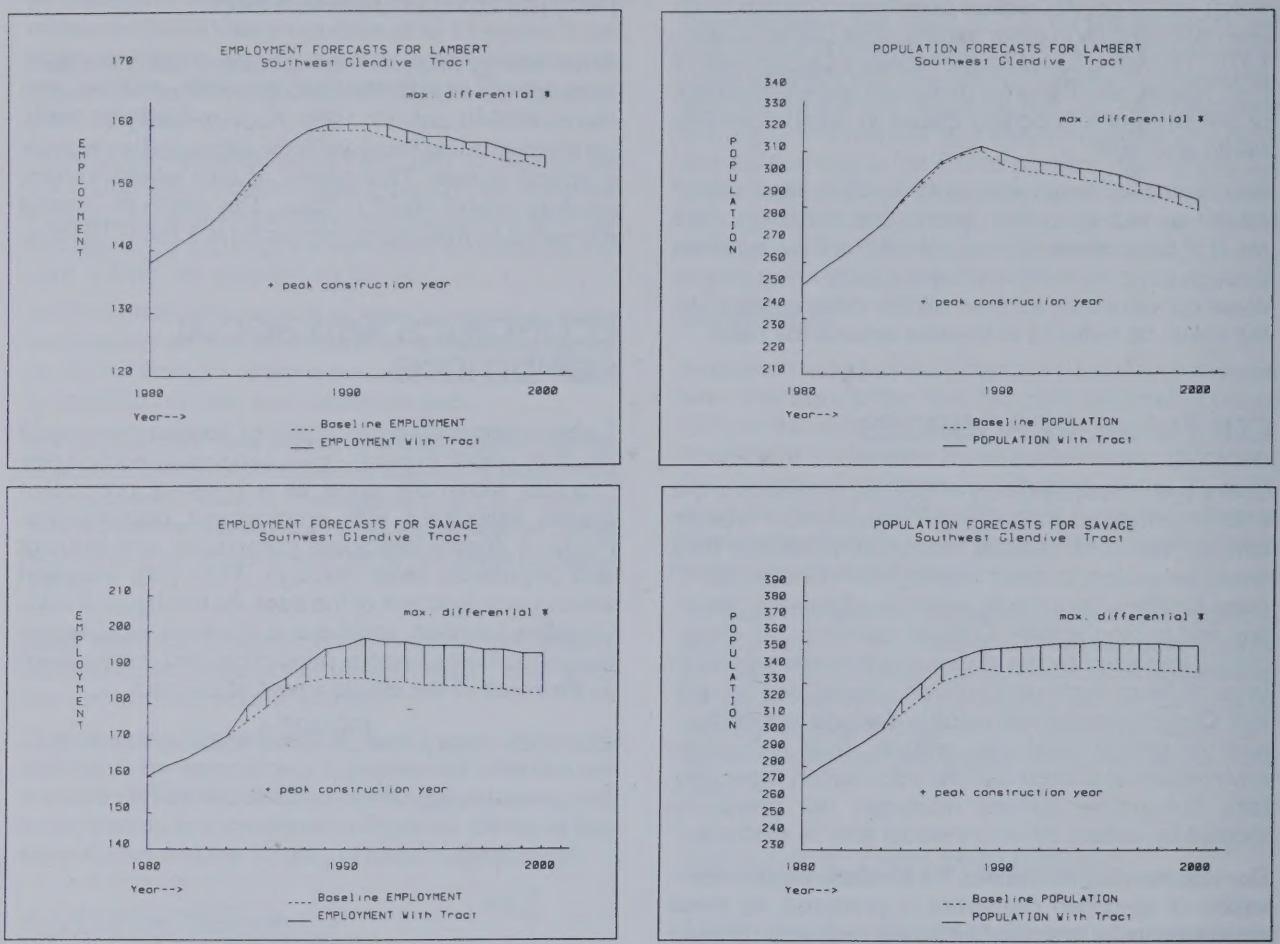


FIGURE 4 (continued)



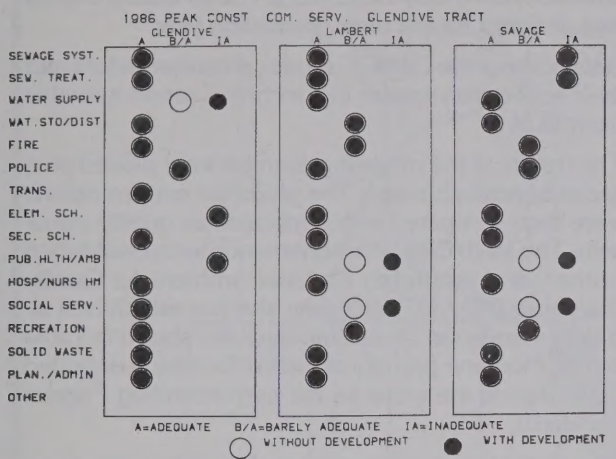
SOURCE: Mountain West Research, Inc., 1981.

Changes in regional personal income from tract development are expected to be insignificant through the year 2000. The communities in which the workers and their families reside would experience some increases in economic activity as a result of employment payroll expenditure and through company expenditures for goods and services during the construction and operation phases. The Glendive tract is forecasted to boost regional personal income by a maximum of 0.6 percent over baseline values by 1991 and beyond as a result of expenditures associated with the operations phase of this tract.

Peak employment during the construction phase of the tract is expected to occur in 1986 at 265 employees with full operations employment expected in 1991 at 450 employees. Using 1986 as the first primary impact date, it is estimated that the communities of Glendive, Lambert and Savage would experience an inadequate level of one or more community services as a direct result of the 1986 peak construction employment/ population levels associated with construction of the tract (Figure 5). Glendive, for example, is forecasted to face an inadequate water supply situation as a result of population growth attributable to the construction of the Glendive tract. Additionally, Sidney, Fairview, Richey, and West Glendive would experience an inadequate level of some community services by 1986 even without tract development. A tract-related population influx in these communities would further exacerbate an inadequate service situation; however, the inadequacy of these services could not be directly tied to tract development.

Full operation of the Glendive tract (i.e., 1991 and beyond) is expected to result in impacts on community services. Figure 6 shows that Glendive would experience inadequate police protection as a direct result of the population influx resulting from tract operation. Additionally, the following communities in the study area are forecasted to face inadequate public services by 1991 even without tract development: Sidney, Fairview, Lambert, Savage, Richey, West Glendive. Development of the Glendive tract would further worsen an inadequate service situation in these communities.

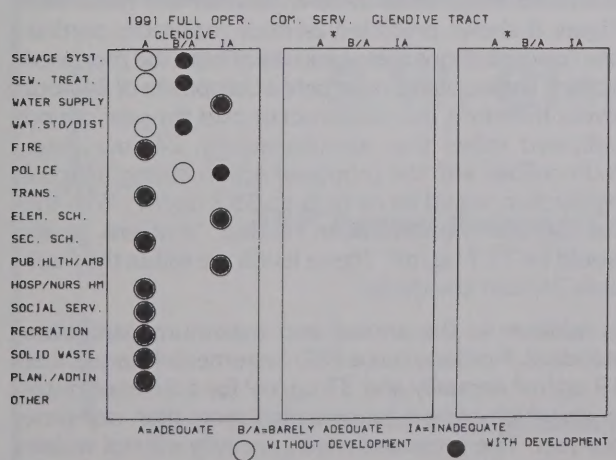
FIGURE 5



SOURCE: Respective city/county or regional planners.

The adequacy ratings appearing in Figures 5 and 6 reflect assessments by either city-county or regional planners' for the communities involved and constitute the planners best judgments concerning the fiscal (revenue/cost) situation likely to be encountered by the communities in 1986 and 1991. Several of the services appearing in the community service graphics are of greater importance than others in maintaining public health and safety. Basic services such as sewage collection and treatment, water supply and water storage/distribution, health care and police/fire protection are of more immediate concern to community well-being than are nonbasic services such as recreation facilities and libraries. Consequently, communities which experience impacts to these basic services would undergo somewhat greater difficulties than would a community which experiences impacts on its nonbasic services. Additionally, inadequacy of basic services (water and sewage systems especially) can be difficult for a community to deal with because of the relatively large capital expenditures required for upgrading these types of services.

FIGURE 6



SOURCE: Respective city/county or regional planners.

The great bulk of the social effects attached to development of the Glendive tract would fall in Glendive and West Glendive, Dawson County. During the construction period of the mine, roughly 500 persons above the baseline would be expected to reside in those two communities. During the operations phase, the increase over the baseline exceeds 1100 persons. While these numbers are significant it should be considered that Glendive and West Glendive together are, relative to other communities in the area, quite large in population and could absorb relatively large numbers of persons without undue disruption of ongoing local social processes such as religious behavior, political behavior, patterns of interaction, community cohesion, and so on.

In Sidney, Richland County, roughly 100 persons would be attached to development in the short-term construction phase while roughly 130 persons would be residing in the community during the operations phase. In both cases these numbers represent increases over baseline population projections. In Sidney, given its size and social and economic diversity, these new residents would not be significant, representing only a one to two percent increase over the baseline. Thus, there would be little noticeable effect on Sidney that could be attributed to development of the Glendive tract.

Since residents of both Richland and Dawson counties indicate that the existing social atmosphere is the best thing about living in the areas, it would be expected that development of the Glendive tract would have some adverse effect on these local characteristics, particularly in Glendive and West Glendive. A faster pace of life, more traffic, increasingly formal patterns of interaction, and similar changes would occur for some residents due to development. It is possible that some of the existing deficits in medical care and retail opportunities would be positively affected by development as new persons and firms might be attracted to the area.

Mitigation of social and economic impacts can be accomplished through several technical and/or financial categories from both federal and state sources. These include:

1. Mountain Plains Federal Regional Council Energy Impact Office. This office has several functions designed to alleviate impacts on counties and communities, including: (a) provide information about and facilitate applications for technical and financial assistance, (b) develop and participate in workshops for state, local, federal, and industry people on impact assessment and mitigation, (c) encourage and facilitate development of local energy impact assessment task forces.

2. HUD, USGS, DOE, EPA and Department of Labor are all active in sponsoring advanced planning and mitigation assistance. However, because of federal budget cuts, it is unclear whether any federal agencies will be committed to providing technical assistance to state and local governments in energy impacted areas.

3. The Farmers Home Administration (FmHA) 601 Program provides grants to designated (approved) coal impact areas for planning, site acquisition, and development of public facilities and services in addition to housing on sites owned by a city or county. However, currently there are no Montana counties in the Fort Union Region which are designated as being eligible for FmHA 601 monies.

4. States currently receive 50 percent of the federal mineral leasing royalties. This money could be used to mitigate impacts in those areas which are impacted by federal mineral development.

5. Montana Department of Commerce (formerly the Department of Community Affairs (DCA)) provides direct technical assistance to communities in the coal resource areas of eastern Montana. This assistance includes workshops and training sessions in local planning and impact assessment, growth management and impact migitation techniques, funding sources for planning and public facilities and others.

6. The eastern Montana field office of the Department of Social and Rehabilitative Services is available to assist eastern Montana communities assess and plan for human service impacts.

7. Funding by the Montana Coal Board is available to local governments which have been required to expand the provision of public services as a consequence of large scale development of coal mines and coal-using energy complexes. These funds originate from an 8.75 percent portion of the revenues from Montana's coal severance tax.

Technical reports are available which discuss the methodology used in the economic or social analyses.

CLIMATE AND AIR QUALITY

Impacts on climate from the proposed action would be localized and insignificant. The modification of surface contours and surface reflection due to redistribution of soils and removal of vegetation may produce slight localized changes in windspeed and direction, temperature, and humidity. Reclamation with reestablishment of vegetation would largely mitigate these impacts over the long term.

The methodology for determining the air quality impact of particulate emissions consisted of (1) obtaining mine profiles for each tract from the U.S. Geological Survey (USGS), (2) obtaining emission factors for individual surface coal mining operations, (3) using the mine profile and emission factors for calculations of total emissions, (4) entering the emission data into a modified climatological dispersion model (CDMQC) for prediction of ambient concentrations, and (5) comparing predicted concentrations to National and State air quality standards and to Prevention of Significant Deterioration (PSD) increments. The air quality impact was analyzed for the peak production year.

Details about the CDMQC model, emission factors and their application appear in a technical report available from BLM

The results of the modeling exercise were plotted on a series of isopleth maps. The predicted concentrations were then compared with applicable air quality standards. The 1970 Clean Air Act Amendments established primary and secondary National Ambient Air Quality Standards (NAAQS). Montana also has established air quality standards. These standards are shown in Table 5. The Montana primary standard for total suspended particulate is the same as the corresponding Federal standard.

All pollutant sources must be evaluated to determine if Prevention of Significant Deterioration (PSD) regulations apply. These standards are also shown in Table 5.

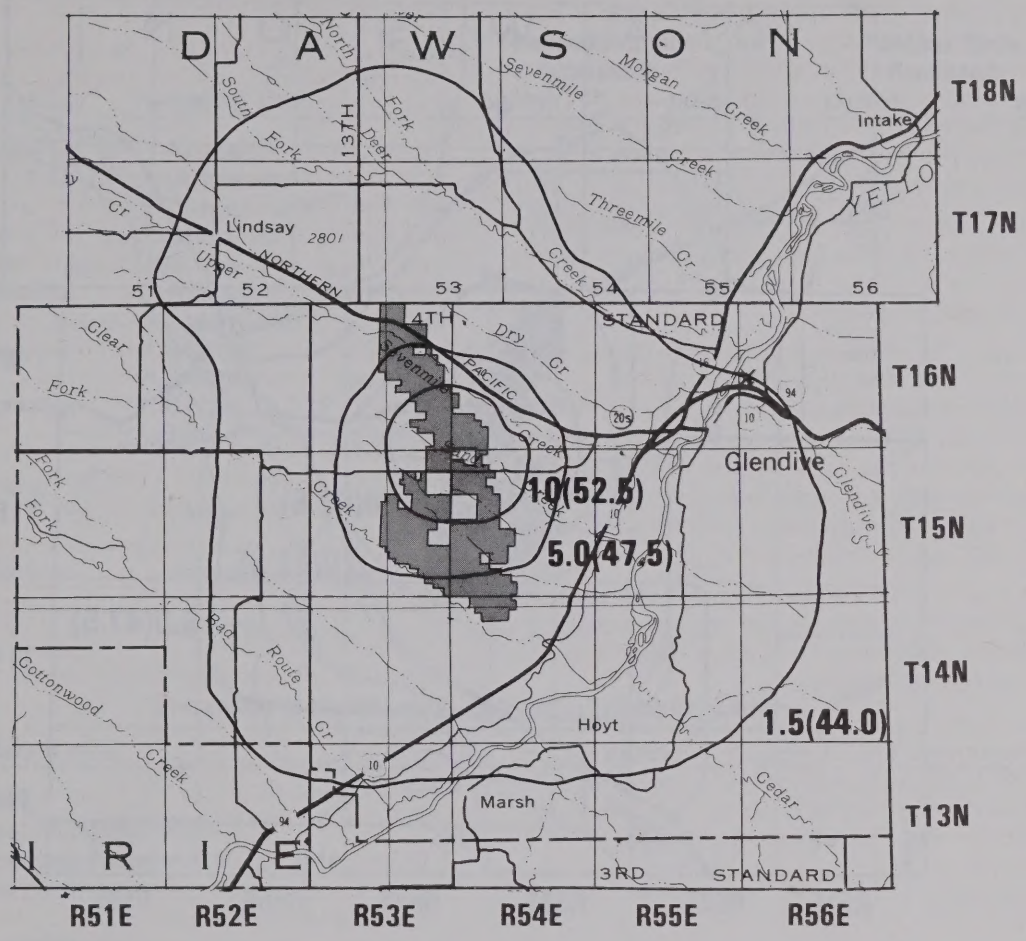
During the peak coal production mining period, total particulate emissions from the proposed action are predicted to be 3980.7 tons per year, with best available control technology applied.

Dispersion modeling was performed to predict particulate concentrations for comparison with the National Ambient Air Quality Standards and State of Montana standards. Areas within the active mining area, such as the mine facilities, pit areas, and reclamation areas, are not subject to these standards.

The isopleth lines on Figure 7 indicates annual geometric mean average particulate concentrations that will result from implementation of the proposed action. During peak coal production, the highest annual geometric mean concentration at a location off the mine site would be 12.3 ug/m^3. With a background concentration of 42.5 ug/m^3, the highest annual geometric mean ambient concentration would be 54.8 ug/m^3. This value is less than the Montana particulate standard of 75 ug/m^3.

Montana's 24-hour standard of 200 ug/m 3 cannot be exceeded more than once a year off the mine site. Figure 8 shows predicted 24-hour maximum particulate concentrations that would result from the proposed action. The isopleths represent a composite of 24-hour levels; therefore, the values occur over the year period indicated rather than simultaneously. 24-hour maximum values with the proposed action during full coal production would be as high as 35.2 ug/m^3. With the background concentration added, ambient levels would be 77.7 ug/m^3. These levels are within the Montana 24-hour standards.

In addition to the annual and maximum particulate standard, Montana has a PSD incremental standard of 19 ug/m^3 annually and 37 ug/m^3 for a 24-hour maximum which cannot be exceeded more than one time per year. The proposed mining activity will not violate these standards.

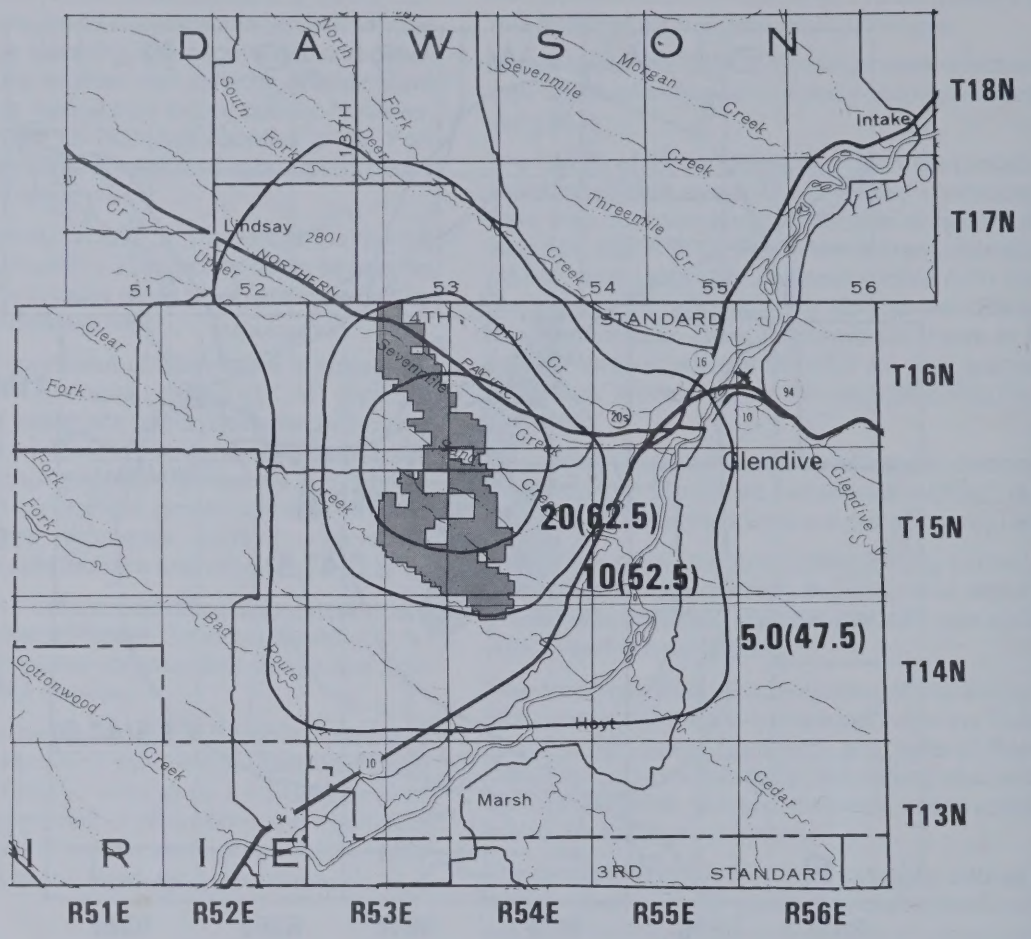


S.W. Glendive Tract

TSP Annual Average Concentration (ug/m³) Isopleths

Note: Number in parenthesis indicates predicted concentration plus background concentration.

FIGURE 7



Scale 1:500,000

10 0 10 20 Miles

S.W. Glendive Tract

TSP Maximum 24-hour Concentration (ug/m^3) Isopleths

N

Note: Number in parenthesis indicates predicted concentration plus background concentration.

FIGURE 8

TABLE 5
Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Primary Standards ug/m³	Federal Primary Standards ppm	Montana State Standards ug/m³	Montana State Standards ppm
Sulfur Dioxide	Annual (Arithmetic)	80	0.03	60	0.02
	24-hour	365	0.14	260	0.10
	3-hour			650	0.25
Total Suspended Particulate	Annual (Geometric)	75		75	
	24-hour	260		200	
Carbon Monoxide	8-hour	10,000	9		
	1-hour	40,000	35		
Photochemical Oxidant	1-hour	240	0.12		
Nitrogen Dioxide	Annual	100	0.05		
Lead	3-month	1.5			

Prevention of Significant Deterioration (PSD) Regulations

Class II area	ug/m³
Sulfur Dioxide	
Annual Arithmetic mean	20
24-hour maximum	91
3-hour maximum	512
Particulate matter	
Annual Geometric mean	19
24-hour maximum	37

Source: National Ambient Air Quality Standards 1970; Montana State Department of Health and Environmental Sciences.

Several small sources of gaseous pollutants (sulfur dioxide, ozone, and nitrogen dioxide) are associated with surface coal mining operations. These include haul trucks, front-end loaders, scrapers, and dozers. Sources also include light-duty vehicles (chiefly pickup trucks) operated in the mine and employee vehicles operated on mine access roads.

Review of the Site Specific Analysis Reports for the Powder River tracts that had similar tons per year of coal production to the Fort Union tracts indicates that gaseous emissions are not expected to violate any air quality standards.

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SUMMARY MATRIX
SOUTHWEST GLENDIVE TRACT
Resource and Environmental Considerations

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Topography	Varies from flat table land to dissected rolling terrain.	Less contrasting topography with original drainage patterns reestablished.	Low	Good	
Geology and Minerals	Tract is underlain by formations that are prospectively valuable for oil and gas. There are no known wells on the tract.	None	None	Acceptable	
	Tract contains 461.4 million tons of coal.	Loss of 46.1 million tons of coal for future use by current recoverable techniques.	Low	Good	
Soils and Reclamation Potential	There are 34 soil series in the tract mapped at level 2 in a survey done by SCS which are found along sedimentary plains and high terraces on uplands.	There will be displacement of soil by water and wind erosional forces; change in soil structure and natural fertility.	Significance of the impact will be high. Reconstruction potential is rated as 54% fair and suitability of soil material for reclaimability is rated as 70% fair and 1% unsuitable.	Data reliability is 40% from the Dawson County Soil Survey for rangeland and 60% reliable for bottomlands.	The better soils in the bottomlands were more accurately mapped than those on the rangelands and steep-sided slopes.
Hydrology Surface Water Quantity	The tract is drained by several small intermittent streams that flow in response to thunderstorms & snowmelt. Flow is southeast to the Yellowstone River. Combined flow from all streams at the eastern boundary of the tract is estimated to be about 6,000 ac.ft./yr.	No significant impact is anticipated.	Small	Fair-good	
Quality	Storm runoff would generally be a calcium bicarbonate type with dissolved solids ranging from 200 to 800 mg/l. Low flows & base flow would range from 800 to 3000 mg/l in dissolved solids & would probably be a sodium sulfate type.	No significant impact is anticipated.	Small	Poor-fair	No samples of flow have been taken for chemical analysis, therefore, dissolved solids content is only an estimate.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Alluvial Valley Floors & Flood Plain	No portion of the tract is considered to be a potential AVF.	None			
Groundwater Use in Tract	22 stock wells and 9 domestic wells lie within the tract. All are developed in the Alluvium or Tongue River Aquifers.	All wells will need to be redrilled if needed following mining. Domestic wells would probably need to be completed in deeper aquifers to obtain comparable water.	Minimal costs for mining company to redrill wells.	Good	
Quantity	Natural groundwater flow in the near surface aquifers flows southeastward toward the Yellowstone River. Yields range from 3 to 20 gpm. Flow in the deeper Fox Hills-lower Hell Creek aquifer is to the northeast.	Mining could cause lowered water levels in wells outside the tract boundaries.	Possibly significant in nearby wells used for domestic supplies.	Fair-good	No significant impact is anticipated from development of additional public water supplies.
Quality	Water from the alluvium & terrace gravel contain about 200 to 450 mg/l of dissolved solids, mainly calcium and bicarbonate, and lesser amounts of magnesium, sodium, sulfate. Water from the Tongue River aquifer is a sodium bicarbonate type & contains 450-2000 mg/l of dissolved solids with substantial sulfate.	Mining could cause degraded water quality owing to additional solution of dissolved ions by groundwater passing through returned spoils.	Possibly significant to domestic wells downgradient of the tract.	Fair-Good	
Vegetation: Prairie Co. Grassland, Sandy Grassland, and Badlands Grassland	Native vegetation covers 57% or 12,162 acres of the tract. Primary tract use is by crop and livestock operations, with a few small irrigated fields, and one small surface coal mine. Vegetation provides food and habitat for wildlife, retards erosion, and improves air and water quality.	Kinds of Vegetation and Acres to be disturbed: Sagebrush 6379 Grassland 4037 Badlands 805 Riparian shrub 857 Hardwood trees 52 Juniper 32 Total Acres 12,162	High due to long term elimination of established plant communities and reduction of species.	Data reliability is 95% from the Dawson County ASCS Committee. Reliability determined by cross-checking data received. No data at present lists kinds and numbers of wildlife on the tracts.	Many native plant species may be lost through mining. Impacts may be lessened by immediately respreading topsoil.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Livestock Forage in Animal-Unit-Months (AUMs) (Dawson County Average)	Average Production is 2,372 AUMs.	Average annual loss of 79 AUMS. Each acre would be out of production from 10 to 15 years. Maximum loss for any one peak mining year would be 4,013 to 6,081 acres and 783 to 1,186 AUMs.	Moderate to high depending upon individual operation. Low to moderate for overall tract.	Grazing data from Dawson County Conservation Districts Long Range Program Circa 1975.	If the rangelands were in excellent condition, the total loss projections due to mining would be 24,324 AUMs.
Threatened or Endangered Plants	There are no reports of threatened or endangered plants in the mining area	Low	Low	Good	No plants in MT have been accepted as yet by the FWS for inclusion on the threatened or endangered plants list.
Noxious Weeds	There are 6 noxious weeds identified in the Richland-Glendive Planning Unit. Leafy spurge was reported west of the tract (Sec. 16 and 21 of T.16N., R.53E.), and Canada Thistle was found in the Sevenmile Creek drainage, downstream from the tract. The other plants are: 1 Russian Knapweed 2 White top 3 Field Bindweed 4 Sow Thistle	Low	Low	Data obtained from the Richland-Glendive Planning Unit Documents developed in 1978.	The impact depends on whether mining operations disurbed noxious weeds before or after seed has been produced & how topsoils containing noxious weed roots are handled.
Agriculture	There are 8,964 acres of land in the tract that are currently being cropped. The irrigated lands are found adjacent to the bottomlands.	Average annual loss of 149 acres excluding 3,379 total acres of summer fallow. Annual production on this 149 acres would be 4,232 bu. of wheat. Maximum loss in any one peak mining year would be 1,481 to 2,245 acres and 42,060 to 63,758 bu. of wheat.	Moderate to high depending upon individual operation. Low to moderate for overall tract production.	Data reliabilty is 95% from the Dawson County AG. Stabilization and Conservation Committee. Reliability of data determined by cross-checking data received.	
Land Use	No industrial activity. Some farming. Ranching is primary use.	Introduction of industrial activities. Land required for mine facilities, roads, railroad spur, pipeline, and transmission lines. A 300-foot buffer zone required on 12 residential homes. A 100-foot buffer zone required on a cemetery. Relocation or 100-ft buffer zone required for public roads/highways, railroads, pipelines, and transmission lines.	Moderate during mining, Low to none after reclamation.	Good	Existence of mine facilities may encourage further development of area.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Recreation	There are no facilities in the area. Road access is adequate. Seasonal sport hunting and rock-hounding probably exists in tract.	Displacement of hunters during mining phase. Earth disturbance will probably uncover Montana moss agates for rockhounds. Additional personnel in the area will create recreation pressure at existing facilities	Not Great	Fair	
Wildlife					
Sharp-tailed grouse	Good populations	Destruction of seven dancing grounds if not declared unsuitable.	Reduction of hunting opportunities in general area.	Good	
Fisheries	Small population.	Would destroy.	Low- Negative if returned to present condition. High-Positive if fishing lakes developed.	Good	
Threatened & Endangered and State Species of Special Concern	Not assessable until baseline study complete (Dec., 1981).			Not available until studies completed.	
General					Increased poaching and disturbance would significantly reduce all wildlife populations in the region. If not controlled it would significantly reduce recreation opportunities
Cultural and Historical Values	Tract not inventoried to date. BLM-sponsored inventory scheduled for 1981. Expected prehistoric resources include lithic scatters (70-80%), stone circles (10-20%) ceramic bearing sites, rock shelters, kill sites (10% combined). Expected historic resources include homestead and ranch remains (50%), historic rock art (20%), freightroads, dugouts, cairns, trading posts, burials & battle sites (30% combined).	Direct impact to all cultural resources in the tract through damage and destruction and increased erosion, access and vandalism.	Damage and destruction to sites, artifacts, their immediate environmental context & the data these contain.	Good to Excellent	Expected resources in tract have been extrapolated from the literature on reported sites in the Fort Union RCRA's and inventory surrounding the Fort Union Region (BLM unpublished, Davis, 1976; Greiser, 1980; Johnson, 1977; Reeves, 1970.)

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Wilderness	N/A	None	None	N/A	N/A
Visual Resource Management	Class C scenery. No significant landscape features. Northern part of tract is rough terrain, consisting of drainage coulees. Southern portion is mostly utilized for dryland farming. Visual intrusions exist in area - i.e., roads, powerlines.	The disturbance of 18,431 acres needed for the project. Additional intrusions would include mining equipment and other facilities needed for the mining phase. The additional traffic load and dust pollution will be visible signs of activity. Utility corridors will also stand out.	Medium to high	Fair	
Climate and Air Quality	Excellent	Minimal background addition. All applicable standards will be met.	Insignificant	Fair	

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Economics and Social Conditions

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Population/ Employment	Population and employment levels are forecasted to be relatively stable through the year 2000.	Communities of Glendive, Lambert and Savage would experience population and employment increases.	Low to moderate significance.	Good	See population and employment graphics in Chapter 3 for greater detail.
Regional Personal Income	Regional Personal income forecasted to increase moderately through the year 2000.	Slight increases in regional personal income.	Insignificant	Fair	
Infra-structure	Most services are either adequate or barely adequate in Glendive, Lambert and Savage.	These three communities would experience inadequacy of one or more services.	Glendive would experience significant impacts on its water supply situation.	Excellent	See Chapter 3, community service graphics for greater detail.
Residents' Perception of Community Services	Problem Areas: Dawson County a) medical b) recreation/ entertainment Richland County a) roads b) medical care c) entertainment	Not Applicable	Not Applicable	Dawson - Good Richland - Good	
Social Attitudes	Respondents were generally in favor (conditionally) of coal development.	Not Applicable	Not Applicable	Dawson - Good Richland - Good	
Quality of Life	Most residents cited small town atmosphere friendliness, etc. as favorable attributes.	Some slight deterioration in small town atmosphere is likely.	Insignificant		

SOUTHWEST GLENDIVE TRACT
UNSUITABILITY CRITERIA RESULTS

Criterion	Applicable to Tract	Exception Used (if applicable)	Additional Data Needed	Comments
1. Federal land systems	Applied	N/A	N/A	No federal land systems found within the tract.
2. Rights-of-way and easements	Applied	None	None	Applied to Federal surface and/or private surface over federal coal.
3. Buffer Zones	Pending	N/A	Yes	Requires agreements w/local governments and private owners of dwellings.
4. Wilderness study areas	Applied	N/A	N/A	No wilderness study areas found within tract.
5. Scenic areas	Applied	N/A	N/A	No scenic areas found within tract.
6. Land used for scientific studies	Applied	N/A	N/A	No lands used for scientific study were found within the tract.
7. Cultural and historical sites	Pending further study	N/A	Yes	Applied upon completion of inventories (Dec., '81)
8. Natural areas	Applied	None	None	No designated natural areas within the tract.
9. Federally listed endangered species	Pending further study	N/A	Yes	To be applied in Dec. '81.
10. State listed endangered species	Pending further study	N/A	Yes	To be applied in Dec. '81.
11. Eagle nests	Pending further study	N/A	Yes	To be applied in Dec. '81.
12. Eagle roosts and concentration areas	Pending further study	N/A	Yes	To be applied in Dec. '81
13. Falcon cliff-nesting sites	Pending further study	N/A	Yes	To be applied in Dec. '81
14. Migratory birds	Pending further study	N/A	Yes	To be applied in Dec. '81

Criterion	Applicable to Tract	Exception Used (if applicable)	Additional Data Needed	Comments
15. State resident fish and wildlife	Pending further study	N/A	Yes	To be applied in Dec. '81
16. Flood plains	Applied	None	None	No significant flood plains were found within the tract.
17. Municipal watersheds	Applied	None	None	No municipal watersheds were found within the tract.
18. National resource waters	Applied	None	None	No natural resource waters were found within the tract.
19. Alluvial valley floors	Applied	N/A	None	No drainages within the tract qualify as AUFs.
20. State proposed criteria	Applied	None	None	No State criteria

PRELIMINARY FACILITY EVALUATION REPORT

PRELIMINARY

FACILITY

EVALUATION

REPORT

PRELIMINARY FACILITY EVALUATION REPORT

GOALS AND OBJECTIVES

The Fort Union Regional Coal Team, in its consideration of leasing federal coal, will address the likely coal end-uses and their implications. The purpose of evaluating how the coal will be used is to present the most probable major impacts of development.

The end-use facility evaluations are at a reconnaissance level and the reports are presented only as general approximations of facility characteristics and impacts.

The uncertainty of actual end-use facilities and the inherent problems in defining a "typical facility" limit end-use analysis to broad generalizations. The evaluations are not meant in any way to substitute for detailed site specific evaluations, EISs, or analyses which come later when mining and facility projects are actually proposed. The end-use facility evaluations will not preclude any federal, state, local, or private decisions concerning actual end uses, facility siting, or end-use restrictions. The end-use reports are meant only to provide additional information to be used in decisions concerning the leasing of federal coal in the Fort Union Region and should not prejudice any later decisions.

End-use evaluations, referred to as preliminary facility evaluation reports, have been prepared for those tracts for which a new coal-use facility is expected to be built. One of the three proposed end-use facilities has been assigned to those tracts based on expressions of interest, tract size, or existing facilities. The typical facilities to be considered are: a 250 million standard cubic feet per day gasification plant; a 1,000 megawatt electric power generation plant; and an 85,000 barrel per day indirect coal liquefaction plant.

Part I of the report summarizes what the assigned typical end-use facility might be like. The description of the facility gives plant size, process technology, plant requirements (fuel, land, water, power), emissions, and other characteristics of facilities likely to be proposed in the Fort Union Region. The description includes ancillary facilities and a discussion of construction and operational aspects of the facility that are relevant to determining impacts that could occur in the vicinity of the tract.

The facility description is based on existing analyses, studies, environmental impact statements, and consultation with State and industry representatives. Part II of the facility report is an analysis of the facility impacts on the tract area.

The preliminary facility evaluation reports will be used by the Regional Coal Team to rank federal coal tracts with a better understanding of likely future development impacts and implications.

PART I

Assumptions and Variables

The typical indirect liquefaction facility characteristics based on numerous assumptions and reasonable values for important variables. Some of the assumptions and variables are based on best estimates. Others are based on existing literature, facilities, and on input from industry sources.

Facility Location, Type, and Size

Because of the economics of lignite coal, it was assumed in the early stages of the Fort Union coal leasing process that the end-use facilities would be near the tracts to be leased. The energy value of lignite coal as well as the water content make the transporting of lignite for long distances uneconomical. For purposes of issue level impact analysis, the indirect liquefaction facility assigned to the Southwest Glendive tract is not specifically located but assumed to be near the tract. Such an assumption will eliminate the problems of arbitrarily siting facilities. Facilities were sited, however, for the air quality modeling. Where specific site location information was available from potential project developers, it was used in the facility analysis. The typical indirect liquefaction facility would produce 85,000 barrels per day of methanol. The plant would use the Lurgi gasification process. The synthetic gas would then be converted to methanol. Based on industry proposals for liquefaction facilities, this indirect liquefaction process of coal to gas to methanol will be the prevalent process used in the region for at least the next 10 to 15 years. Many of the assumptions concerning indirect liquefaction are based on the Nokota Company's proposed methanol plant.

Construction Period

The construction time span for a synfuel facility can vary greatly. A company hiring four to five thousand construction workers could complete the proposed facility in as short a time span as three years. A company could choose to lengthen the construction period or build parts of the plant capacity in two or more construction phases. This would reduce the construction work force and spread construction over as many as ten years.

The assumption is that the typical facility will be constructed in phases. The typical indirect liquefaction facility will be assumed to have a two phased construction period with each phase lasting four years. The construction of one phase would result in partial plant

capacity in operation earlier, enabling the company to generate an early return on their investment. Construction of one phase should provide the company with technical information, enabling them to make modifications in the second phase.

Employment

The construction work force will be a function primarily of the construction schedule. Work force numbers were supplied by the Nokota Company. While the Dunn-Nokota Methanol Plant is scheduled for a five-year construction period, the generic methanol facility will have the same construction schedule and work force as the generic gasification plant.

Water Requirements

Water demands for an indirect-liquefaction facility depend on production technology, operation time, and water quality. The values used for water requirements are based on estimates from Nokota. The value for gallons per minute is an estimate of average water use for the facility. The yearly requirements are an approximation based on an operation factor assumed for the facilities. This operation factor indicates the time the facility will be in operation each year. For analysis purposes, water for the methanol plant is assumed to come from the Fort Peck Reservoir.

Emissions

The air emissions for a methanol plant will depend primarily on the facility's production process, the amount and quality of coal burned, the level of pollution control, and whether or not the facility produces its own electric power.

An important assumption is the source of a facility's electric power. The proposed generic facilities would require from 100 to 150 megawatts of electric power for peak plant operation. It will be assumed that the indirect liquefaction facility will produce its electric power on the plant site with coal-fired boilers and steam turbines.

An assumption affecting air emissions from a generic facility is the quality of the coal. The sulfur, ash, and water content of the lignite will not only influence emissions per ton of coal burned, but will also determine the amount of coal required for a given facility. The amount of coal required for a generic indirect liquefaction facility could vary from 11 to 14 million tons per year depending on the coal quality and certain process characteristics.

The air emissions from any type of coal conversion facility will be a function of the conversion process characteristics and the emission control technology used at the facility and the level of control used. The possible variation is evident when the emission rates for the Great Plains Coal Gasification and Nokota facilities are compared. The two facilities will produce approximately equivalent amounts (BTU values) of gas and methanol. The emissions for the two facilities are expected to vary considerably, due to the difference in the level of emission control planned for each facility.

The impacts resulting from air contaminants emitted by the coal end-use facility are deduced by using established air quality standards above which deleterious effects of the contaminants are implied to occur. A facility's ability to meet air quality standards assumes there would be no significant deleterious effects to human health, animals or vegetation. Such an assumption is the subject of continuing discussion and is disputed by certain research studies. A more detailed discussion of this issue can be found on pages 37-94 in the Final West-Central North Dakota Regional Environmental Impact Study on Energy Development (October 1978). The facilities could also emit certain pollutants for which there are no standards. The anticipated levels of air quality concentrations of contaminants are obtained by measuring existing levels of air quality and adding computer simulation of the atmosphere loading resulting from the end use facility.

The air quality impacts are considered in terms of ambient air standards and prevention of significant deterioration standards. Under authority of the Clean Air Act of 1970, the State of Montana has promulgated its own ambient air quality standards. The purpose of the Montana Ambient Air Quality Standards is to control the quality of the air over Montana such that a) the health of sensitive and susceptible segments of the population will not be adversely affected; b) concentration of pollutants will not cause public nuisance or annoyances; c) significant damage to animals, ornamental plants, forest and agricultural crops will not occur; d) visibility will not be significantly reduced; e) metals or other materials will not be significantly corroded or damaged; f) fabrics will not be soiled, deteriorated, or have their colors affected; and g) natural scenery will not be obscured. Montana's ambient air standards are generally more stringent than the federal EPA standards, and they include a number of criteria for which there are no EPA standards, such as visibility (Class I areas only), hydrogen sulfide, and fluoride.

Under authority of the Clean Air Act Amendments of 1977, Prevention of Significant Deterioration (PSD) standards apply to all areas that are in compliance with federal standards for particulate matter and sulfur dioxide. PSD establishes three air quality classes. Class I areas allow only a small incremental increase in pollution beyond existing conditions in the area at the time of designation. The bulk of the United States was designated Class II, which allows for well-planned growth and some additional pollution, although within limits that are well below the standards. Class III applies to areas of industrial growth and permits incremental increases in

pollution up to, but not exceeding, the standards. Since 1974, Congress, the states and Indian tribes have been eligible to petition EPA to classify areas Class I and Class III, providing that various specified procedures are followed. Wilderness and certain other specially managed areas in existence before August 1977 received automatic Class I designations, and the Northern Cheyenne Tribe requested and received Class I status for its reservation in mid-1977.

The federal Clean Air Act states that pollutants originating in Canada are to be included in calculating the existing air quality of neighboring regions of the United States for purposes of enforcing the PSD standards, unless the governor of a state takes action to exclude such pollutants.

After March 1979, the states were to be responsible for administering the PSD regulations and for processing redesignation petitions. However, due to changes in the federal rules, PSD delegation for Montana has not yet been approved. The Air Quality Bureau is presently evaluating procedural alternatives for PSD administration.

An in-depth analysis of air quality impacts resulting from facilities associated with certain coal lease tracts was impossible. Discussion of site specific impacts without addressing the interactive and cumulative impacts would have little decision value. For the purpose of this analysis, the end use facility which has been assigned to the coal lease tract will be discussed. This discussion will contain general statements regarding facility impacts on the air quality. The impact analysis is based on standard dispersion computer modeling using the worse case situation. The anlysis is in terms of compliance or noncompliance with ambient air quality standards or PSD standards. A limited analysis of this type cannot be substituted for a detailed permit review. Care must be taken to use this information with the proper qualifiers and should not be taken out of context.

Solid Wastes

Estimates of solid wastes from the facility are based on figures from Nokota. Estimates for ash and sludge could vary considerably depending on the ash content of the coal and the pollution control technology used. Planned facilities are proposing to dispose of solid wastes in the nearby mines.

INDIRECT LIQUEFACTION FACILITY

Introduction

The typical lignite coal liquefaction plant would use an indirect liquefaction process to produce methanol from synthetic gas. The facility would produce an average of 85,000 barrels of methanol and 3,000 barrels of gasoline blending stock each day. The indirect liquefaction complex situated near its coal source would consist of the following major units: 1) coal preparation, storage, and handling; 2) gasification units; 3) methanol synthesis units; 4) process facilities; 5) pollution control facilities; and 6) ancillary facilities. See Figure 1.

The plant layout for an indirect liquefaction facility would be very similar to that described for coal gasification. The only major difference would be the addition of methanol synthesis units which would require no significant additional space.

The total land area dedicated to the indirect liquefaction plant site would be about 960 acres. Major structures would include: 1) gasifiers/methanol synthesis units; 2) coal preparation facilities; 3) boiler plant; 4) boiler stack; 5) compression building; 6) other buildings—administration, shops, warehouse; 7) ponds for clarified water storage, process water, and storm water catch basin; and 8) distillation and absorption columns.

Lignite received directly from the nearby mine by truck or conveyor would be crushed, sized, and sent to storage piles. When needed, the coal would then be resized, weighed, and sent by conveyor either to the gasification unit or to the steam generation area. The supporting utilities would include steam generation and distribution, power generation and distribution, oxygen production, raw water supply and water treatment, and fire protection. The wastewater treatment system would be designed for maximum reuse within the plant. No wastewater would be discharged to surface waters. Gaseous waste streams would be treated prior to discharge from a 500-foot stack. Waste solids from coal processing, wastewater treatment units, and from the ash handling system would be dewatered and disposed of at the mine. By-products would be recovered, stored, and either consumed in the plant or sold. Water from a nearby source would be used in the gasification process, in steam generation, in cooling, and for plant utility and sanitary purposes. There would also be a product pipeline to transport the methanol away from the facility.

Employment

The construction of an indirect liquefaction facility would be completed in consecutive phases. Phased construction would involve building one half of the plant's capacity in about four years followed by a four-year construction period for the second half. Construction employment will peak late in the third year with approximately 3,000 workers. Table 1 shows average yearly employment. Once the facility is in full operation, it would employ about 900 workers.

Figure 1

METHANOL SYNTHESIS

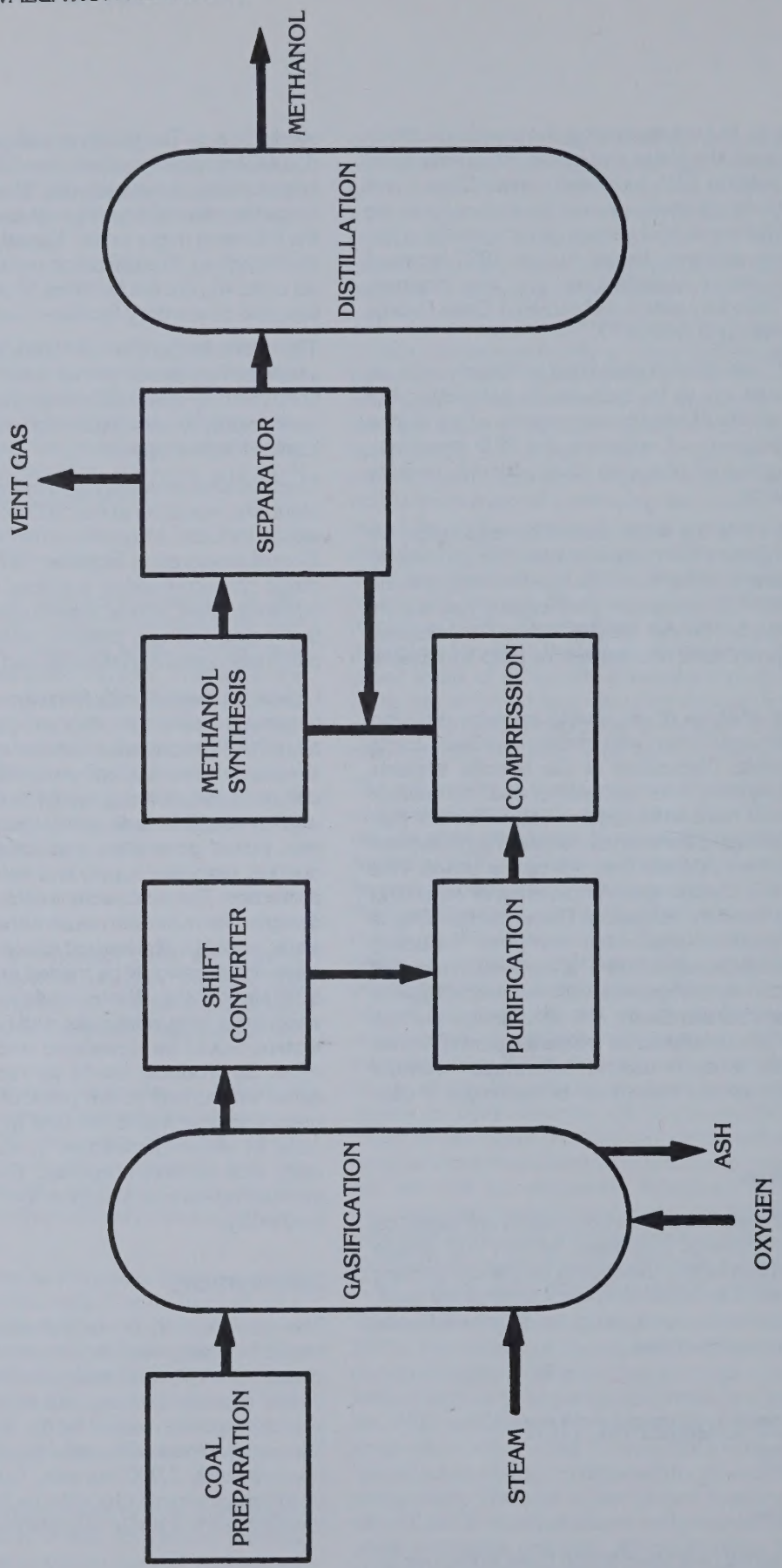


TABLE 1
AVERAGE YEARLY EMPLOYMENT

Year	1	2	3	4
Construction	230	1376	2617	2192
Permanent			440	580
5	**6**	**7**	**8**	
567	1388	2094	1317	
580	580	580	900	etc.

SOURCE: American Natural Resources Company, the Nokota Company.

Coal Preparation, Storage, and Handling

After crushing, weighing, and sampling, the lignite coal would be conveyed to either an active or inactive storage pile. The inactive storage pile would amount to a 30-day supply and would only be used during extended shutdowns in the mine. The live storage pile would feed the plant on a day-to-day basis. The indirect liquefaction plant would require approximately 14 million tons of coal to be mined each year. See Figure 2.

Gasification Process

The gasification/methanol process uses the same gas production technology as the gasification facility. In the gas production section, coal, steam and oxygen are reacted under conditions of controlled temperature and pressure to produce a crude gas containing methane, hydrogen, carbon monoxide, carbon dioxide, excess steam and various by-products and impurities. Before leaving the gas production section, the hot crude gas is cooled and scrubbed to partially remove impurities. The ash is sent to disposal. The crude gas from the gas production section is split into two streams. One stream is sent to the shift conversion section. The other stream bypasses the shift conversion section and is sent to the gas cooling section. The shift conversion section adjusts the hydrogen-carbon monoxide ratio in the crude gas stream. The shifted gas is then also sent to the gas cooling section. In addition to lowering the temperature of these two gas streams before they are combined, the gas cooling section also removes more by-products and impurities from the feed streams for processing in the gas liquor section. The combined gas streams are sent to the gas purification section which removes naphtha and acid gases (carbon dioxide and hydrogen sulfide). The stream is then sent to the methanation section. The function of the methanation section is to upgrade the heating value of the gas feed stream from the gas purification section. The upgraded synthesis gas is then passed once more through the gas purification section.

The methanol synthesis unit produces 85,000 barrels per day of methanol using the Lurgi methanol process. The gas is combined with recycle gas and heated to the reaction temperature then fed to the methanol converter. The converter effluent is cooled, and the liquid methanol, separated from the gas, is sent to the drying section where the water content is reduced.

Process Facilities

The main boiler plant for the gasification facility would generate steam to drive turbines for electric power generation, to drive compressors and large pumps and to supply process steam for coal gasification. A 500-foot stack would disperse flue gases from the steam boilers, the super heater, and other heaters. Steam generated in the high pressure boilers will power extraction condensing turbines driving the three air compressors in the oxygen plant. The steam from the air compressor turbines will be combined with steam generated in the methanation waste heat boilers. This steam will then be supplied to the gasifiers and to the turbine drivers. Average operating electric power requirements would be approximately 150 megawatts. The oxygen facilities would provide gaseous oxygen to the gasification process.

Raw water would be piped in from a nearby water source. Pump capacity would be installed to meet the normal plant operating requirements of approximately 7,800 gallons per minute. The facility would require approximately 11,500 acre feet of water each year. Raw water entering the plant will be processed in a clarifier. Water not sent to the cooling towers will be filtered further for plant use.

Emission and Pollution Control

The two principal sources of gaseous effluents at the facility—gaseous waste streams from the gasification methanol process and the combustion flue gas streams—will be treated to reduce the concentrations of SO_2 with a scrubbing system and particulates with electrostatic precipitators. Gaseous streams containing hydrocarbons will be incinerated. The steam boiler flue gas will be treated prior to being combined with the other gas streams for discharge via the common stack.

TABLE 2
AIR EMISSIONS (lbs/hr)

Particulates	Sulfur Dioxide	Nitrogen Oxides
230	2600	4420

Source: Nokota Company for the Dunn Center Methanol Plant.

Water will be recovered to the maximum possible extent for reuse. That which is not recovered will either be disposed of with the solid wastes or lost as vapor from cooling processes.

The ash contained in the coal is recovered from three sources: 1) the gasifier ash from the Lurgi gasifier; 2) the bottom ash from the steam boilers; 3) the fly ash

Figure 2

COAL HANDLING SYSTEM

from the electrostatic precipitators in the steam and electric power generation section. The gasifier ash and the boiler bottom ash are conveyed to the dewatering facilities which separate the ash and water. The dewatered ash, a free flowing solid containing 20 percent water, will be disposed of at the mine. The recovered water is recycled to the ash sluiceway. The fly ash is collected by electrostatic precipitators. This ash is sprayed with water to prevent dusting as it is withdrawn from the storage silo. It will then be disposed of at the mine.

TABLE 3
SOLID WASTE (tons/hr)

Dry Ash	Dry Sludge	Water
117	14	44

Source: Nokota Company for the Dunn Center Methanol Plant.

Ancillary Facilities

Suitable loading and unloading facilities would be provided to ship and receive materials by either pipeline, truck or rail. Storage would be provided in suitable closed tankage. There would be handling (and storage) facilities for the following major materials: methanol, caustic soda, sulfuric acid, propylene, phenols, gasoline blending stock, ammonia, sulfur, and creosotes.

A railspur would connect the facility with an existing rail system. The spur would have a 150-foot right-of-way. Rail loading and unloading facilities would be provided for by-products. The water pipeline will require a right-of-way 100 feet in width for construction and 50 feet wide permanently.

PART II

Relationship of Tract and Facility

The Southwest Glendive tract lies ten miles southwest of Glendive in Dawson County, Montana. The tract consists of 21,308 acres of land with recoverable coal reserves of 415.3 million tons.

The likely use of coal mined from the tract would be for an indirect liquefaction plant. To consider the impacts of this coal facility, it is assumed that the typical electric power plant described in Part I would be constructed adjacent to or near the tract with no specific site designated, except for purposes of air quality analysis.

Soils, Vegetation and Agriculture

In the Southwest Glendive tract area, the agricultural land consists of approximately 45 percent cropland, 5 per cent hayland and 50 percent rangeland. Based on 1978-1979 county averages determined from ASCS data and from BLM grazing files annual production per acre would average 28.4 bushels per acre of wheat, 1 ton per acre for hayland and .195 AUMs per acre for rangeland.

Assuming the same agricultural land use distribution for the 960 acre disturbance estimated for a generic indirect liquefaction facility, annual agriculture production foregone on the facility site would be 13,632 bushels of wheat annually, in a worst case situation analysis, for the life of the facility.

A short-term disruption of 12 acres per mile would result during construction of an undetermined length of water pipeline. Roadways would disturb 14.5 acres per mile. A railroad spur, also of undetermined length until final siting of the facility, would eliminate agriculture on 18 acres per mile for the entire life of the facility.

Erosion losses due to wind and water from ground disturbed during the construction phase of the facility, given State permitting stipulations, would not be significant. Regionally, the agricultural production foregone on the 960 acre facility site also would not be significant. Because of the highly-buffered soils in the tract area and downwind, no significant impacts to soils are expected from acid rains.

There is evidence documented in the literature (West-Central North Dakota Regional Environmental Impact Study on Energy Development, 1978) that there are potential negative impacts to vegetation and to livestock downwind from such a facility due to nitrogen oxides, sulfur dioxide and particulate matter. Such negative impacts would be analyzed in detail at such a time as more specific information becomes available prior to facility permit application with the State permitting authority.

Water

Water requirements for an indirect liquefaction facility are approximately 7,800 gallons per minute or 11,500 acre feet per year. The likely source of water for industrial use is Fort Peck Reservoir. Withdrawal of water would have no significant impact upon the reservoir. Facility wastes of ash, sludge and water disposed of in the mine do have the potential to degrade water quality if they are disposed of within the saturated zone which develops upon reclamation. Present regulations require state approval of disposal sites.

Land Use

Changes in land use include displacement of existing use, increased intensity of existing uses and the introduction of new uses. The site of the facility is likely to displace agricultural use.

The optimum site conditions for facilities are the same as for agriculture, that is: gentle topography and soils with good drainage characteristics. The increase in population of communities results in demand for new housing, additional commercial development and expanded public use facilities. The area of this development will likely be on off-site agricultural land. The on-site displacement of agricultural land use is discussed in the Agriculture section of this report.

Increased population would create a demand for community services as addressed in the Economics and Social Conditions section of this report. This demand implies a need to expand existing facilities and commercial establishments or to create new ones. Existing commercial establishments may suffer through the construction of new facilities outside the downtown areas. Public services would be stretched in the short term by lack of capital to implement change due to increased population. Parking shortages, traffic congestion and excessive wear and tear on roadways would make downtown areas less habitable. Municipal organizational structures and physical space may prove inadequate with increased population. For example: a part time mayor may be overworked, processing of permits may delay private building construction and filing space for public records may prove inadequate.

With the influx of workers and their families, a change in the composition of the community is inevitable and demands for new forms of public and commercial facilities for shopping, recreation, entertainment would ensue. These types of changes are likely to result in dissatisfaction by both the existing resident population and by the newcomers. Conflicts are likely to occur as a result of the contrast in the lifestyles of these populations.

Existing planning varies considerably from community to community. Some are prepared for change presaged by recent oil and gas development in some areas, while others are ill prepared for the change in population anticipated.

Current perception of county residents with regard to roads, retail opportunities, recreational/entertainment facilities and housing are discussed in detail in Chapter 2 of the Site Specific Analysis for Economics and Social Conditions.

Similarly, forecasts by city/county planners regarding likely changes in community services resulting from facility related population growth are presented in detail in the Economics and Social Conditions section of this report.

Recreation

Recreation in the tract vicinity is limited to dispersed seasonal big game hunting and some sport fishing. Upper Sevenmile Creek supports a population of northern pike. Access depends on landowner consent and climatic factors. Although there are no recreation facilities in the tract vicinity, existing recreation facilities in the region (community camping and picnic areas, Fort Peck Reservoir, and Charles M. Russell National Wildlife Refuge) are expected to receive the majority of recreation demand from the projected population increase. The social attitude survey revealed a concern for existing recreation facilities. It was stated that an increase in population would hopefully result in the possible upgrading of already marginal recreation facilities. This concern will be addressed with the expected recreation demand from increased population in the regional EIS. There is no wilderness in the area.

Wildlife/Fisheries

Impacts of an indirect liquefaction facility on wildlife in the Southwest Glendive tract area could occur in two areas: 1) impacts from destruction of habitat and 2) direct and indirect impacts from the increase in human population.

The removal of vegetation for a 960 acre methanol facility and the expansion of urban areas, highways, and railroads would prevent or reduce the use of an area by wildlife regardless of the type of vegetation removed. Wildlife inventories on and around the tract will not be completed until October 1981. All significant wildlife habitat cannot be assessed until that time. However, much of the area around the tract is believed to be native prairie, with many dancing grounds for sharptail grouse. Both the native prairie and dancing grounds are essential for the grouse.

If powerlines, pipelines, access and haul roads are constructed in key wildlife areas, partial or total destruction of habitat would occur depending on the magnitude of development. The worst case would destroy present wildlife populations in the area. Wildlife oriented recreation such as hunting and wildlife observation would have to be sought elsewhere. Wildlife would be impacted by eagle electrocutions on powerlines, migratory bird mortality from striking powerlines close to wetlands, road kills along transportation routes through important wildlife areas, harassment of wildlife by off-road vehicle use, increased poaching, as well as habitat destruction.

Poaching and road kills have increased dramatically in areas of North Dakota, Montana, Wyoming and Colorado where energy development has occurred. The problem is compounded in areas where transportation corridors are located in important wildlife areas and shift changes coincide with wildlife feeding periods. This situation could occur in the Southwest Glendive tract area.

The impact to wildlife could be mitigated by: 1) siting the methanol plant and associated facilities with regard for critical wildlife areas, 2) adjusting work shifts to avoid feeding times of highly visible wildlife, 3) mass

transportation of employees, 4) providing funds to State fish and game agencies to better control illegal shooting of wildlife, and 5) adopting a poaching clause in union contracts.

Taking water from shallow bays in Fort Peck Reservoir could have significant adverse impacts. These areas are prime nursery and spawning areas for sport, commercial and forage fish. Taking water from deeper none critical areas of the reservoir could reduce or eliminate the significant impacts to fisheries.

The cumulative increases in industrial, urban and other water uses will dictate the severity of the impacts on fisheries. The cumulative impact will be addressed in the regional EIS to be prepared.

Cultural Resources

The Southwest Glendive tract area has not been inventoried to date. Information from existing inventories (BLM unpublished data, Davis 1976; Greiser 1980) outside the Fort Union coal region suggests that the predominant prehistoric sites should be lithic scatters of varying size, density and function (ca. 70-80%). Other expected prehistoric resources include stone circles (ca. 10%-20%), ceramic bearing sites, rockshelters and kill sites (ca. 10% combined). Expected historic resources include homestead and ranching remains (ca. 50%), historic grafitti and rock art (ca. 20%), freight roads, dugouts, cairns, trading pots, burials and battle sites (ca. 30% combined). Further information on cultural resource occurrence, distribution and significance cannot be quantified prior to inventory.

Visual Impacts

Eastern Montana has very high but common visual quality. In the absence of other types of visual experiences, the landscape is not highly valued as scenery because of the vast distances involved in crossing this relatively uniform area. Most highways roll with the landform so views alternate between nearby features at low points and panoramas of up to thirty miles at high points in the roadway profile. The landscape is seen in terms of these short vistas of landscape elements that will not be seen again, and short duration views of distant landscapes in which any vertical object or landscape feature serves as a focal point.

Large structural features in the Eastern Montana landscape contrast with the landscape both in terms of the visual surface (the character of what is seen) and in terms of function. Vertical and linear components of a facility, because of hard architectural edges of the structures, and the transitory nature of panoramic views imply a visual importance of these large objects for orientation. The aesthetic response is secondary to this visual function.

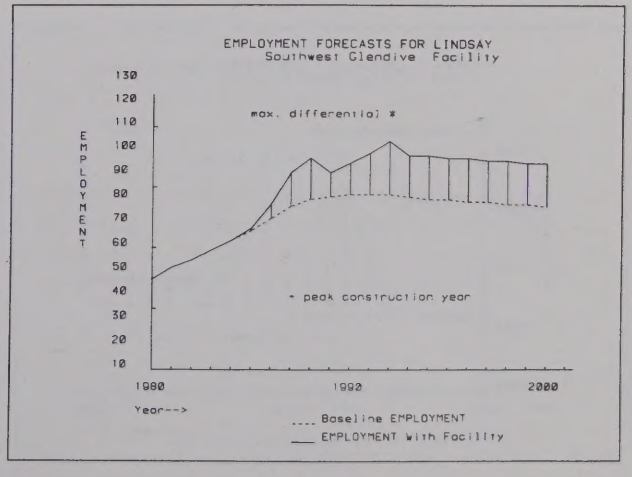
Neglecting cultural bias, the aesthetic response to stark architectural lines and pure planes of color contrasting with the simple curvilinear landforms of the countryside can be considered positive. This visual experience would be immediately comprehensible and would provide relief from a relatively uniform countryside. Beyond this initial response, however, are responses with origins in cultural bias and the individuals' relationships to the land. The greatest effect would be upon local residents with memories of the existing landscape to use as a comparative basis of judgment. If no attachment to the existing landscape is present, the facility would be judged more on its quality than on cultural bias.

The visual impact would be the penetration of the skyline by the facility in views from communities and major transportation corridors. The 500-foot stack could potentially be seen thirty or more miles away. The facility would be highly visible and would demand a response either positive or negative. The dominance of the facility in the landscape could be perceived as a loss of amenity through impairment of the landscape as it now exists for the forty years of the facility's expected life.

Economics and Social Concerns

Construction and operation of the Southwest Glendive facility would result in impacts upon services in some communities within the areas as a result of population growth associated with employment opportunities. Figure 3 shows forecasted community employment and population levels through 2000 both with and without development of the facility. As these figures show, Lindsay, West Glendive, Glendive, Brockway, Richey, Circle, Lambert, Fairview, Sidney, and Savage would experience increases in both population and employment as a result of development.

FIGURE 3



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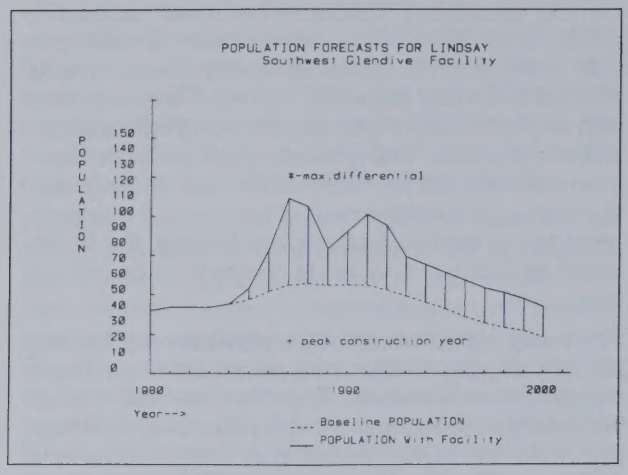

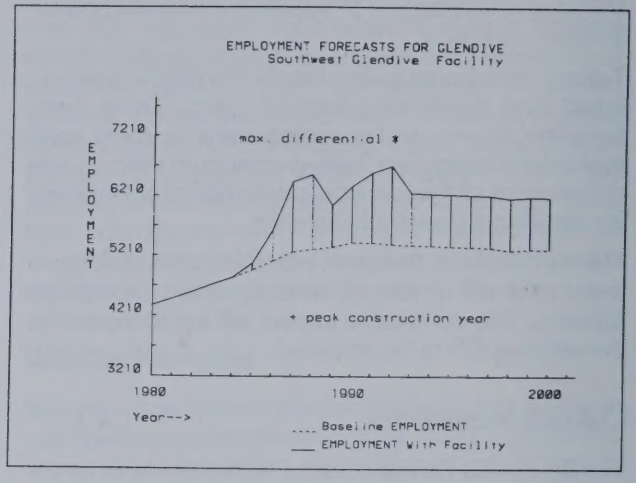

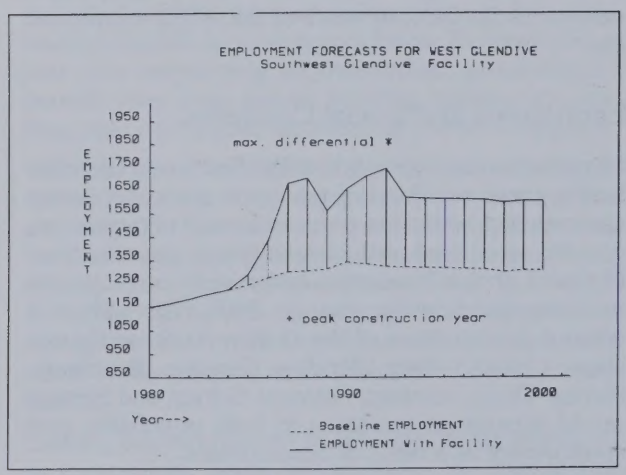

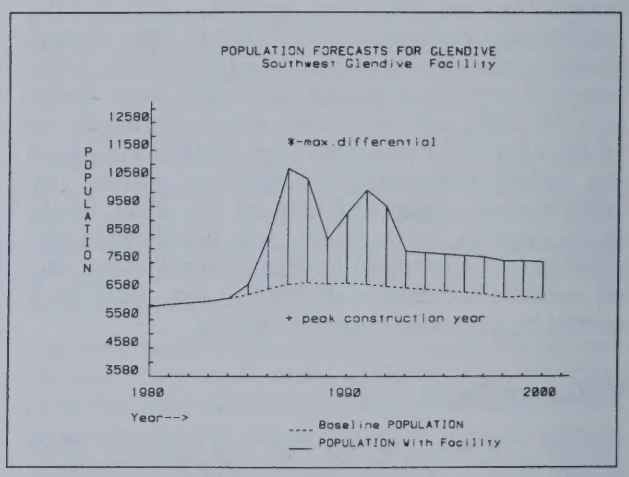

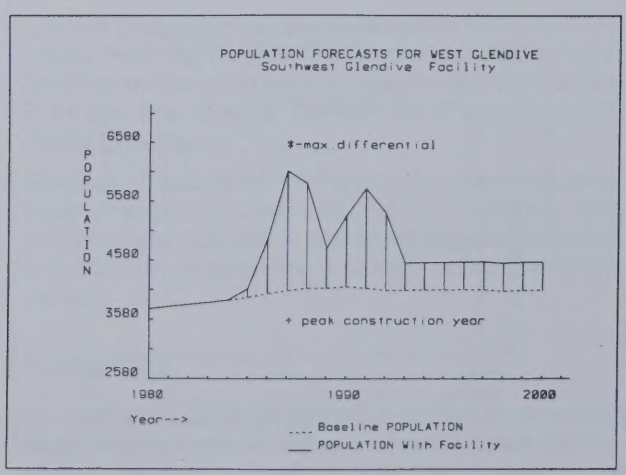

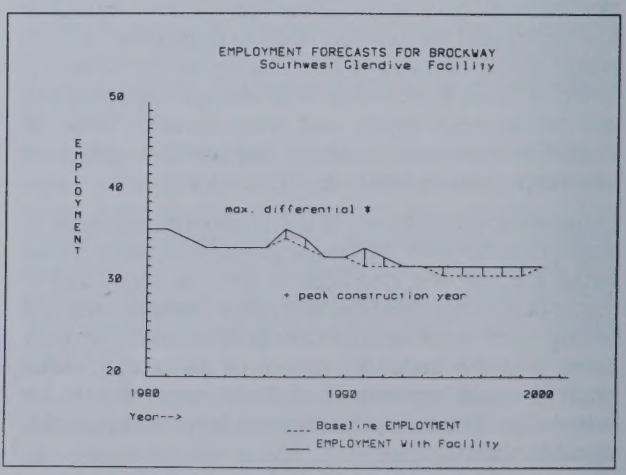

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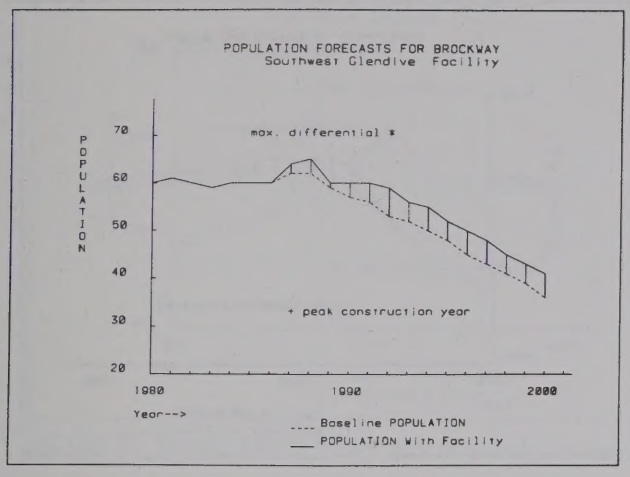

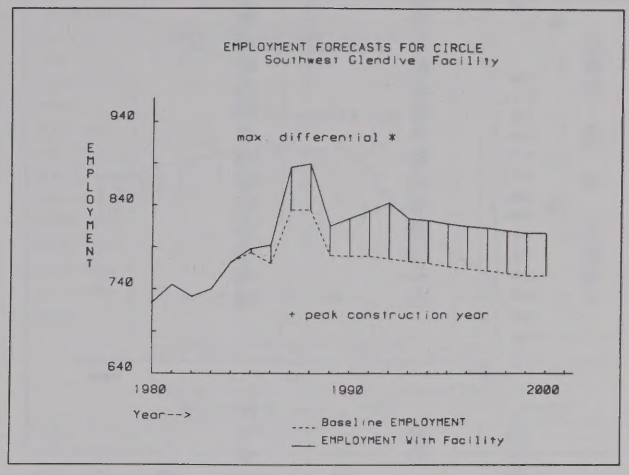

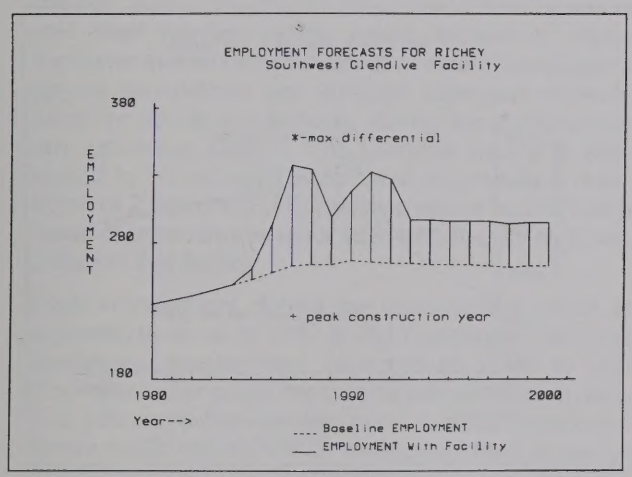

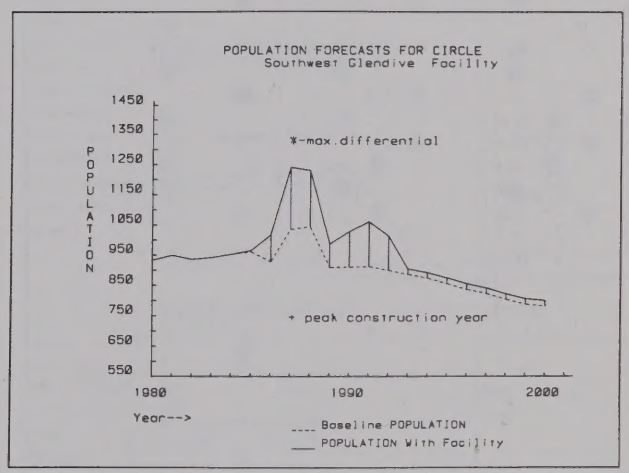

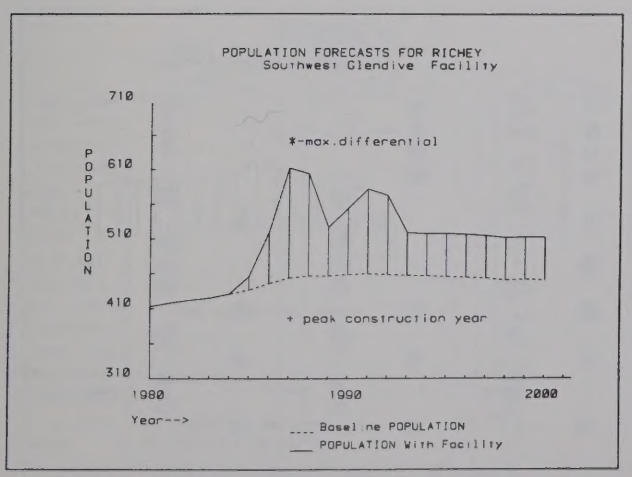

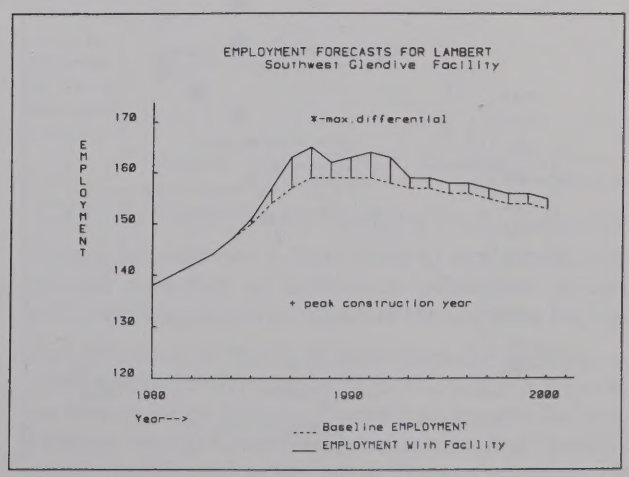

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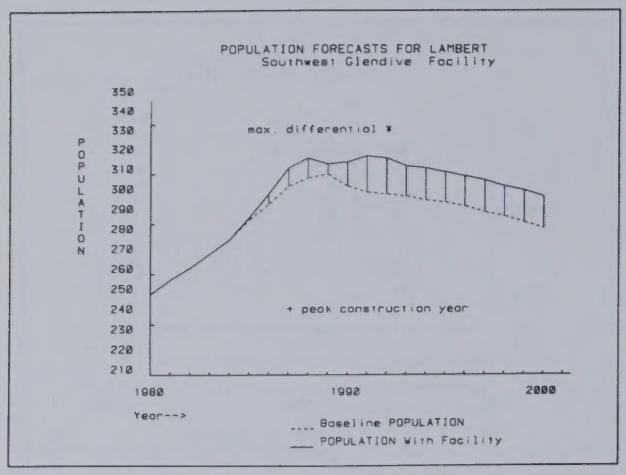
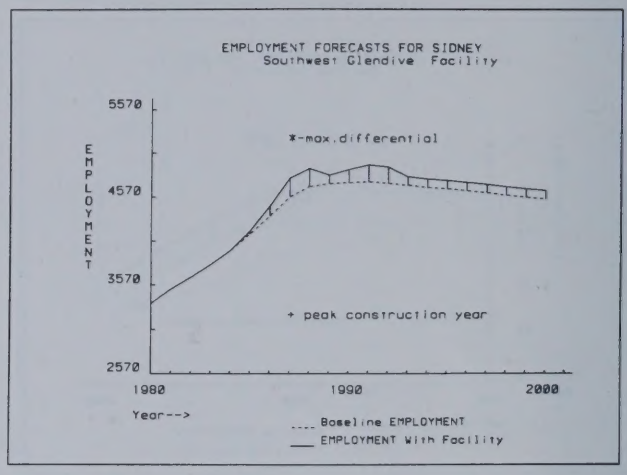
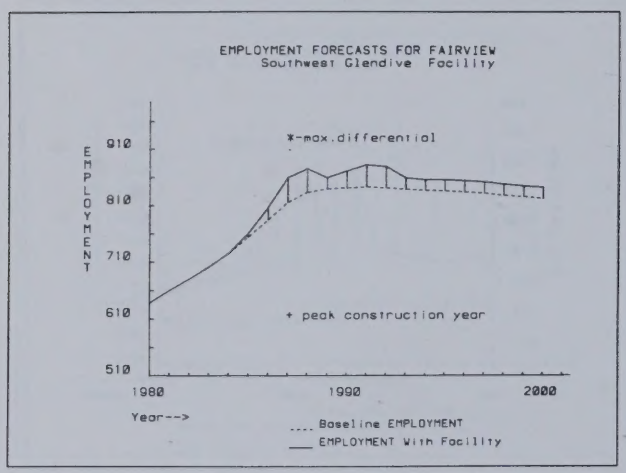
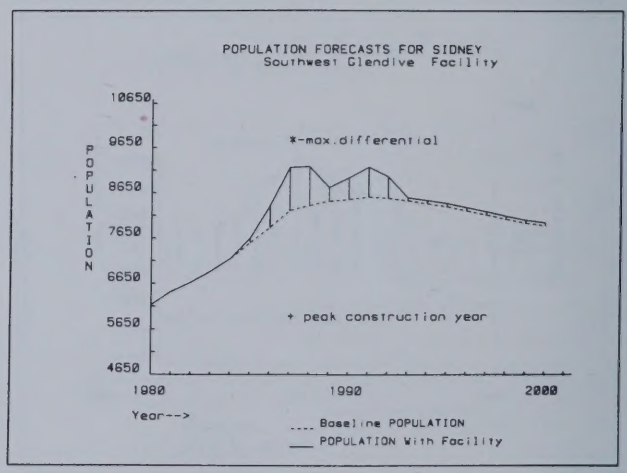
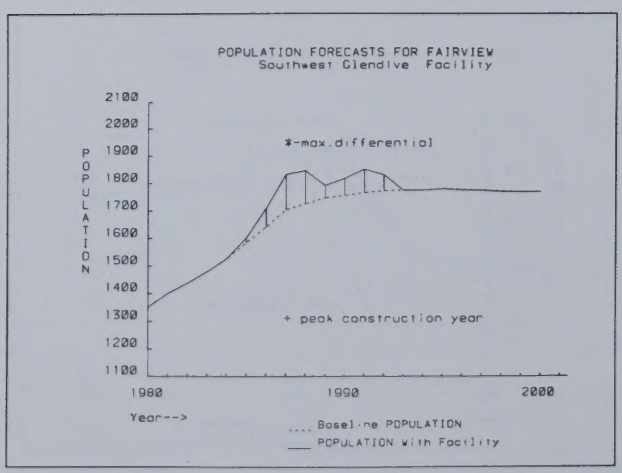










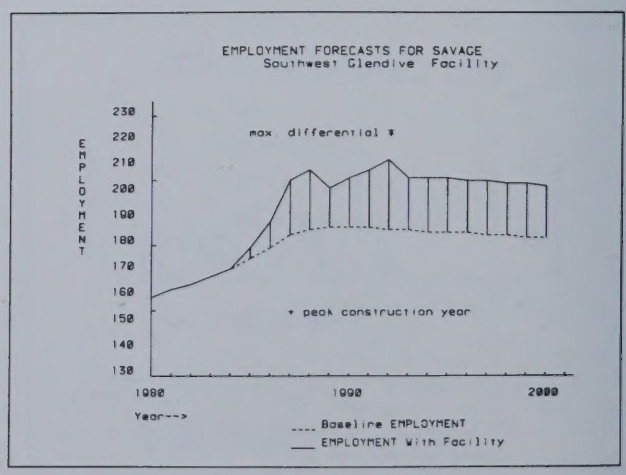
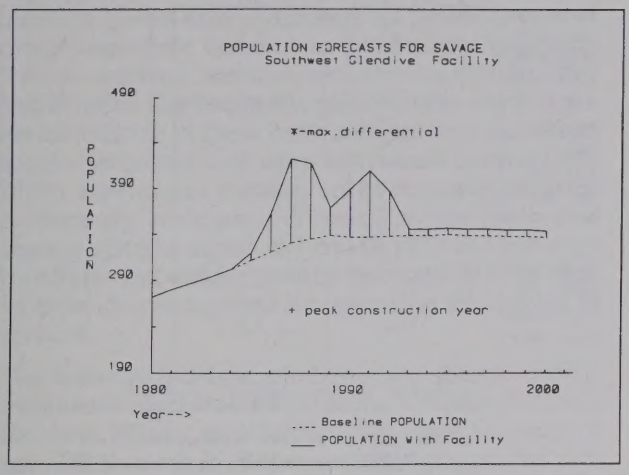


FIGURE 3 (continued)

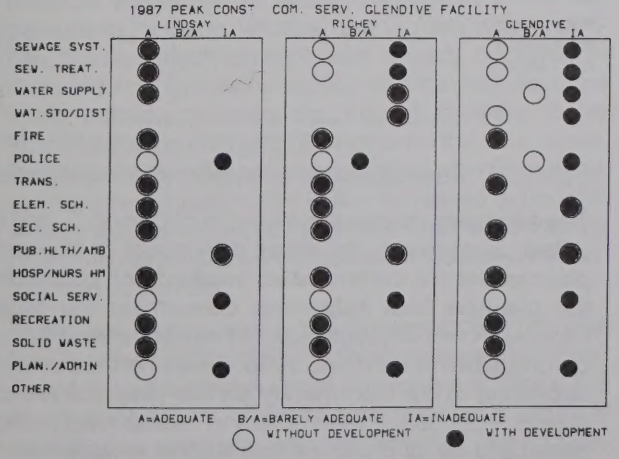


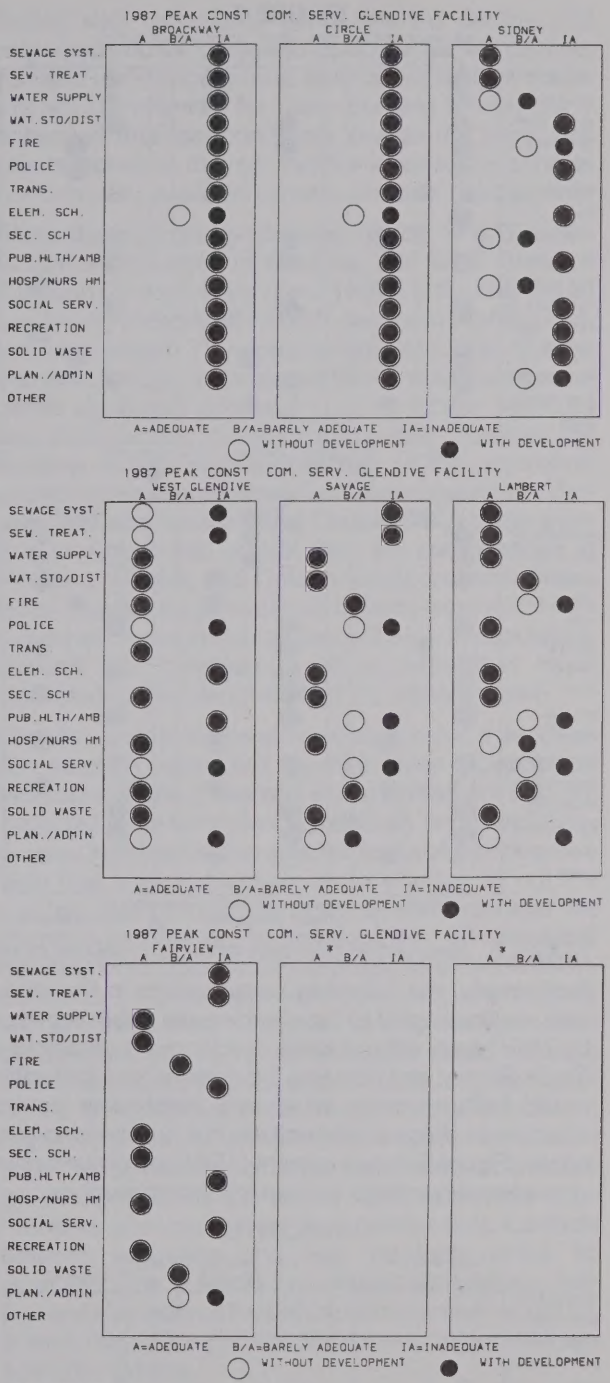
SOURCE: Respective city/county or regional planners.

Changes in regional personal income from facility development are expected to be insignificant through the year 2000. The communities in which the workers and their families reside would experience some increases in economic activity as a result of employee's payroll expenditure and through company expenditures for goods and services during the construction and operation phases. The Glendive facility is forecasted to boost regional personal income by a maximum of 2.6 percent over baseline values by 1987 as a result of expenditures associated with the construction phase of this facility.

Peak employment during the construction phase is expected to occur in 1987 at 2617 employees with full operations employment expected in 1993 at 900 employees. Using 1987 as the first primary impact date, it is estimated that the ten communities mentioned above would experience an inadequate level of one or more community services as a direct result of the 1987 peak construction employment/population levels associated with construction of the facility (Figure 4).

FIGURE 4



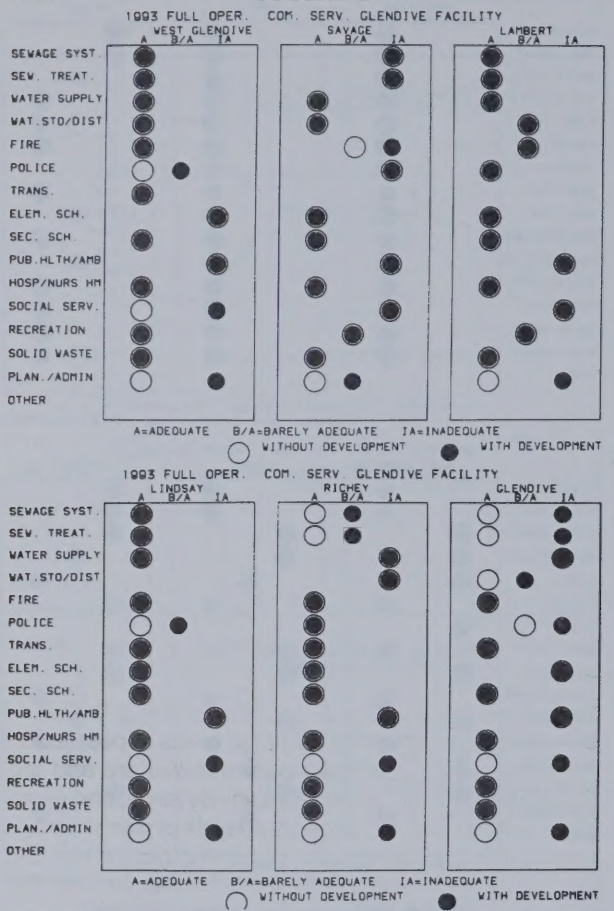


SOURCE: Respective city/county or regional planners.

Richey, for example, is forecasted to face inadequate sewage collection as a result of population growth attributable to the construction of the Glendive facility.

Full operation of the Southwest Glendive facility (i.e., 1993 and beyond) is also expected to result in impacts on communities services. Figure 5 shows that Savage, Lindsay, Richey, Glendive, West Glendive and Lambert would experience inadequate services as a direct result of the population influx resulting from facility operation.

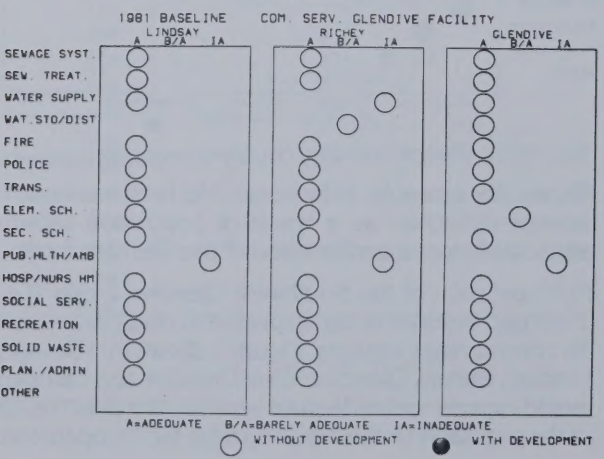
FIGURE 5

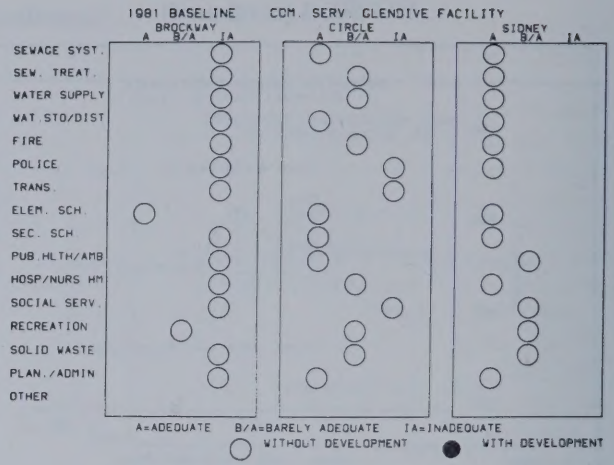


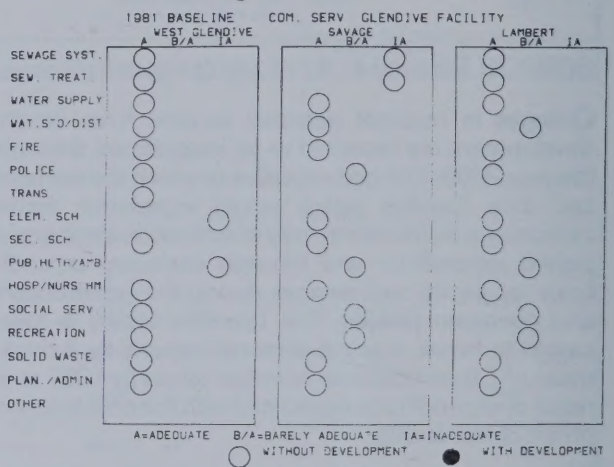
SOURCE: Respective city/county or regional planners.

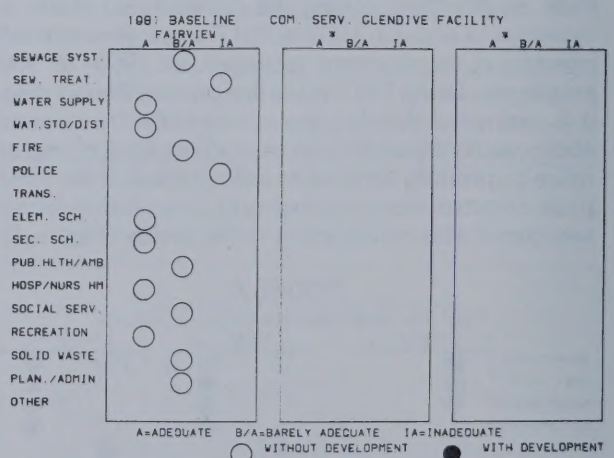
Additionally, the following communities in the study area are forecasted to face inadequate public services by 1991 even without tract development: Brockway, Circle, Sidney, and Fairview. Development of the facility would further worsen an already inadequate service situation in these communities. For comparison purposes, Figure 6 shows current (1981) community service adequacy ratings for impacted communities.

FIGURE 6









SOURCE: Respective city/county or regional planners.

The adequacy ratings appearing in Figures 4, 5, and 6 reflect assessments by either city-county or regional planners for the communities involved and constitute the planners best judgments concerning the fiscal (revenue/cost) situation likely to be encountered by the communities in 1987 and 1993. Several of the services appearing in the community service graphics are of greater importance than others in maintaining public health and safety. Basic services such as sewage collec-

tion and treatment, water supply and water storage/distribution, health care and police/fire protection are of more immediate concern to community well-being than are nonbasic services such as recreation facilities and libraries. Consequently, communities which experience impacts to these basic services would undergo somewhat greater difficulties than would a community which experiences impacts on its nonbasic services. Additionally, inadequacy of basic services (water and sewage systems especially) can be difficult for a community to deal with because of the relatively large capital expenditures required for upgrading these types of services.

The Glendive facility would have both short and long-term social effects in the five-county (Dawson, McCone, Richland, Wibaux, and Golden Valley) area. Generally, it appears, through BLM-sponsored interviews, that support for facilities in the area is quite strong with the possible exception of Golden Valley County, where more than one-half of the contacted residents expressed opposition. In the remaining counties, about two-thirds to three-fourths of the respondents indicated that they support such facilities locally. Across the five county area, the major concern of residents was air quality, followed by their respective communities' ability to absorb rapid population growth and change. Recognition by many residents that their communities would both be larger and more diverse appears to be common.

Among community leaders in the five-county area, support for local facility siting appears to be strongest in Richland and Dawson counties and opposition appears to be highest in Wibaux, McCone and Golden Valley counties, where local officials were fairly evenly distributed in their orientation toward such proposals. As in the general population, leaders in all five counties were most concerned about possible air pollution and rapid growth problems attached to the construction of a plant.

It is likely that a higher proportion of Richland and Dawson county residents are in a position to take direct financial advantage of facility construction than are persons in McCone, Wibaux, and Golden Valley counties. Some industrialization has already occurred in Richland and Dawson counties and it's probable that more persons possess the necessary skills to be employed in the energy industry than in the other areas. Residents in all effected communities who are unable or unwilling to participate in the increased economic activity due to industrialization will experience rapidly changing communities without participating in the distribution of benefits.

Particularly during the short-term construction phase of the Glendive facility, residents (both present and future) would face an altered social environment. Since the social atmosphere of these communities is strongly endorsed by residents, it is very likely that overall satisfaction with community conditions will decline and many individuals' perceived quality of life will decline. As rapid population growth and social changes occur, this will be mitigated for many persons as they enjoy enhanced financial conditions due to the plant. For others, however, they will neither share in the benefits nor be able to avoid the consequences of rapid growth.

While the projected population effects of a Glendive facility are centered in Glendive and West Glendive (Dawson County), other communities in the area would also be significantly affected during the short-term construction phase. The communities of Circle, Sidney, Fairview, Savage, Wibaux, and Beach would each experience significant population growth (above baseline) due to the facility. In these communities, however, the facilities should not be stretched as the population growth levels are relatively low as compared to Glendive. In particular, Richland County is in a better position to absorb this growth than are communities in McCone, Wibaux, and Golden Valley counties. These latter counties are agricultural, have no experience with industrial development, and are quite low in population. Beyond this construction phase population levels attributed to the Glendive plant are relatively low.

Glendive and West Glendive would receive, if the Glendive plant is constructed, very high levels of population increases. While these two communities are and are expected to be fairly diverse, relatively large, and experienced in industrial changes, the levels of growth are so high that it is problematic as to whether or not the resident and officials could successfully manage the changes brought on by development. Six thousand new residents (above baseline projections) is a substantial number of persons even in communities as large as Glendive and West Glendive. During the short-term construction phase, the communities would be more crowded, noisy, stressful, and to many long-term residents, inexperienced with more urban situations, frightening. Many of these long-term residents would be protected by existing social networks, but the community changes would be largely unavoidable as large numbers of persons enter the communities. Conflicts between long-term and new residents could be expected. The political, organizational, religious, leisure, and educational lives of the communities would be, at least during the construction phase, subject to large scale disruptions.

Once such a facility is constructed, patterns of interaction, relations between people and institutions, should stabilize with a new status quo being established. Outside of Glendive and West Glendive, the changes would be scarcely noticeable. In Glendive and West Glendive the industrial occupational element would be evident and thus the relative influence of the agricultural sector in Dawson County would likely be diminished. These long-term changes should not be particularly significant. It is during the construction phase throughout the

five-county area that chaotic and unpredictable social conditions would be most pronounced.

Technical reports are available which describe the methodology used in the economic or social analyses.

Air Quality

The introductory section on assumptions and variables discussed the air quality analysis conducted for the facilities. The result of the analysis is a determination of compliance or noncompliance with Ambient Air Quality Standards and Prevention of Significant Deterioration (PSD) Standards for Class I and Class II areas.

With the use of a screening dispersion model for emissions from an indirect liquefaction facility sited on the Southwest Glendive tract, it has been forecast that the facility would not violate Montana or North Dakota Ambient Air Quality Standards and would not violate PSD Standards for Class I and Class II areas. The increased concentration levels for TSP, NOx, and SO_2 resulting from the facility were forecast to be below the detectable level at the border of the Class I area of the Theodore Roosevelt National Park in North Dakota.

LIST OF SOURCES FOR THE PRELIMINARY FACILITY EVALUATION REPORTS

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The Tenneco Coal Gasification Company; P.O. Box 491, Glendive, Montana 59330.

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